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EDITORIAL NOTES.

Revision of Gas Capital Conditions.

EIGHT months ago—to be precise, in the "JOURNAL" for Nov. 3—we published an editorial article on "The War " and Capital-Raising by Statutory Gas Companies." The principal objects of that article were to view, from the standpoint of the unparalleled circumstances in which the country and Europe were then immersed, the probable effects that the situation as it developed would have upon gas securities and prospective capital-raising by gas companies, and to suggest the advisability of certain forms of relief from statutory regulation as to capital issues during the period that normal conditions, through the war, would be affected by the appeals to investors for heavy sums to finance the war, and to prosecute schemes of trade expansion —appeals which would become, with the lapse of time, more competitive in respect of the terms as to returns upon the money. No particular credit is taken for the points made in the article; they were only those that would have occurred to any intelligent person who then seriously endeavoured to forecast the probable financial situation. The progress of events, however, has fully justified the apprehension then shown. The conditions that appeared bad at the time in regard to prospective capital-raising are already—after only eight months—worse than were then foreseen. Many things have happened since last November which have gravely affected the capital-raising position of statutory gas undertakings. Among other events, the Treasury have put an embargo on capital-raising; and consent to new issues has now to be obtained. Coal and oil prices have gone up considerably—to an extent that has caused an increase in price of gas beyond what, in the early stages of the war, it was considered would be necessary, with the result that, in the case of sliding-scale companies, dividends have substantially receded, and the market value of gas stock has depreciated far more than would have been experienced had not the heavy charge for coal come upon the other value-detracting conditions. Superincumbent is the new war loan, which—with its 4½ per cent. interest, the Government guarantee, and the principal maintained intact by the condition as to repayment at par—has set up a new standard of values for all capital. The Chancellor of the Exchequer (Mr. M'Kenna) has himself stated that one effect of this war loan must be to depress the values of industrial securities; and there is no room for cavil as to the correctness of the prognostication. Before the terms of the new war loan were published, and after the effect in dividend reduction of the price of raw materials was known, Tokenhouse Yard was telling a tale of much reduced values, and of a paucity of buyers at even the fairly low reserve prices placed upon the stocks and shares. Stock at par, paying as much as 5½ per cent. at present gas prices, has not all been disposed of. It is safe to assume that, in view of the new war loan, still less would now be taken up. Considering these matters collectively, there must be the feeling, among those who have been observing the trend of things, that the worst has not yet been seen of the depreciation of the industry's capital-raising power, now and in the immediate future, unless the war is shorter than is anticipated, or unless steps are taken by gas administrators, with the aid of Parliament, to ameliorate the position. In saying this, we have, of course, present in mind that the conditions are only temporary and not permanent. But the temporariness, we are afraid, is something that requires a longer measure than is applied within the normal meaning of the term.

The influences in relation to the question under consideration now seem fairly clear. All must realize that the war is going to absorb a large amount of the capital of the country; and the capital-providing capacity of the country will not for some years be restored to what it is to-day, or to what it was only a few months ago. From now onwards, low interest-yielding capital will have no attractions for the investor, with 4½ per cent. obtainable under Government protection. Although, too, Parliament may regulate the price of coal, it must be at a figure at any rate some 3s. or 4s., perhaps rather more, above 1914-15 contract figures; and so the price of gas must inevitably continue higher and dividends lower than previously. Other expenses—rates and taxes, labour charges, and provision, under the obligations shouldered at the beginning of the war, for men at the front and their dependants—will all for some time be higher; and there will be larger deductions for income-tax from the dividends and interest of investors. This is a sufficiently serious, and to the investors a repellent, state of things; and its effects are cumulative, in respect of capital-raising, for an industry restricted to standard prices and standard dividends, and with cast-iron regulations as to capital issues. Beyond this, the Treasury blockade to capital-raising during the war, and for a period after, means that, when the blockade is raised, there will be a perfect shoal of commercial and manufacturing enterprises competing for the favour of investors—investors who in large part will have denuded themselves of capital through their patriotism and the high rates of interest and security offered them by the Government—and competing on terms to which those who require capital will have to submit in order to satisfy their needs. There can be no question that this is the position that has to be faced; and it is no use burking its consideration.

Any gas director who sits down and tries to picture the capital-issuing conditions of the future in the light of present circumstances, with a war loan paying 4½ per cent. and redeemable at par by the Government—a condition of things which may continue to 1945—should have no difficulty in seeing that his capital-raising powers, being so carefully restricted by standards set up in other times, have been considerably depreciated, and equally he ought to have no difficulty in framing proposals to assist in rehabilitating and improving that position. It is not to the interest of the gas consumer that the undertaking supplying him should be starved for capital; on the contrary, his interest lies in business development which produces economies, and thus tends to reduction of prices. Consumers, large and small, also want sound and attractive investments, and if local ones all the better; and Parliament ought to allow—as they have allowed in the case of the war loan—capital issues on such terms as will appeal to, and encourage, the small investor. In this way, benefit would accrue all round from improved capital conditions. If a case on these lines were made out by the administrators of a gas undertaking, showing benefit alike to undertaking, consumers, and shareholders, it would surely appeal to the sympathies of Parliament, in view of the serious times through which we are passing, and the effect that these times will have deep down in the future. While there may be differences of opinion, owing to differences in individual circumstances, among directors of gas companies as to how best to obtain relaxation of the capital conditions of their undertakings, and make the capital more attractive and more diffusible among investors of all capacities, this must be admitted by them all—that, provided a case could be made out for revision, no time was ever more favourable than the present, or is likely to be more favourable, for asking Parliament to give it consideration. In one or two instances this session, Parliament has shown a desire to be helpful in this matter, and next session, with adverse conditions accentuated, the views of Parliament ought to be exceedingly benevolent. The same with local authorities. We do not think gas directors need be at all restrained in applying to Parliament by any consideration of the possible attitude of local authorities, as, under the conditions set forth in this article, Parliament would, we feel, be extremely impatient of any unreasonable objectors.

Under these circumstances, we repeat, with greater emphasis than was employed eight months ago, that there is

need for the administrators of gas companies to review their capital position, and see whether they cannot carve out of the untoward circumstances created by the war a course which may ultimately redound to the advantage of their undertakings, and especially to that of the consumers. To do this, consideration must be given to the terms in parliamentary enactment which are out of joint with current conditions, and which will inflict a measure of hardship, in comparison with other industries, never contemplated by Parliament when the regulations were applied. Take, for instance, the standard price under the sliding-scale. The standard prices in some Acts of Parliament may have been perfectly reasonable up to (say) July of last year; but then others were not. Anyway, a fair number of standard prices could to-day be found which are not at all compatible with the current and prospective conditions—conditions some of which are permanent (such as the higher price of coal and others materials and stores, the growing competition in coke and sulphate of ammonia, the enhanced price of labour, and increased taxation and rates), conditions some of which will be of long duration due to the war, and the war loan condition which has set up the new standard of capital values. The standard price is a matter which should be reconsidered with the view where necessary to revision.

Another point that Parliament might be invited to look into is the proportion of increased dividend under the sliding-scale. Inasmuch as the investor will expect more for his money in future from gilt-edged securities than he has had in the past, so likewise he will naturally look for an increased share in the profits of enterprise subject to such market risks as gas undertakings must necessarily be. It has often been pointed out to Parliament how small is the proportion of the shareholder compared with that of the consumer of the profits in a sliding-scale undertaking when a reduction takes place in the price of gas. In view of the altered conditions, the investor will for a long time to come, we are afraid, be dissatisfied with this proportion; and unless Parliament acts in this respect with greater generosity towards the shareholder, we shall see a growing disinclination on the part of gas companies to adopt the sliding-scale in the future—a result which would be deplorable in the interests both of the industry and of the consumer. There is also the question as to the revision of the auction clauses, or rather their temporary abandonment, if new issues can be better negotiated without them. Among other new powers which would help the companies to meet the new situation are the following: Power to issue redeemable capital (whether loan, preference, or ordinary), and power to redeem a proportion of existing capital; power to issue loan capital without necessarily issuing any proportion of ordinary capital; an increase of the borrowing power (as was allowed in the Ascot case this session to the extent of one-half the ordinary capital); an increase of the fixed dividend in certain maximum dividend cases with rights of conversion to existing holders. There are some cases, we believe, in which Parliament has fixed the interest on loan and preference capital. These restrictions should all be repealed. In fact, every condition of every kind which clogs the issue of capital should now be removed.

In the same way that Parliament has refused to allow the 4½ per cent. war loan to destroy the value of the 3½ per cent. war loan, so ought gas directors to do what they can to assure that the new conditions—conditions created by the war, and not by the ordinary ebb and flow of circumstances which produce fluctuations of market values—do not unduly depreciate the values of gas companies' stocks and shares, and they ought to do all they can to make them as attractive as possible in view of the new financial situation to which the old standard capital regulations do not apply. The whole matter is one for careful consideration, and a prompt and courageous appeal to Parliament where a company can make out a fair case for the relaxation of its existing statutory conditions, or the enactment of new ameliorative provisions.

Northern Coal Deliveries and Exports Last Winter—A Matter for Inquiry.

THROUGHOUT our comments on the coal situation, there has been an endeavour to make it perfectly clear that the matter was being treated from the general point of view, and that, in so dealing with it, there was no intention to imply that coalowners and factors were all in the same boat in respect of contribution to the difficulties and burdens of the country. We are led to repeat this because one of our correspondents —a gentleman whom we respect, and who is largely interested in the coal trade—in the course of a private letter states that the collieries in which he is concerned are "not "finding any difficulty with regard to the working of our "several contracts with British gas-works, or, in fact, with "any gas-works; and I cannot see why there should be so "much difficulty existing as there appears to be, judging "from public comment." We are glad to have this assurance from one in his position; and those gas undertakings with contracts in his hands are to be sincerely congratulated. All the same, the difficulty of which he speaks has been, and is still for some works, an acute and real one. Within our knowledge, there are several gas-works the managers of which have to-day great cause for fear as to the future. By the same post that our correspondent's letter came to hand, the engineer of a not unimportant gas-works wrote to us that, while price was the subject of much anxiety for him, a greater present cause of anxiety was the securing of coal, and seeing it safely in stock on his works. Another engineer, with upon him the technical and commercial responsibility of a large concern, tells us that, soon after the Coal Export Regulation Committee set to work, he became much more hopeful as to stocks; and, during the period that the Committee have been exercising control of the coal sent to neutral countries, his stocks from the North, which well into May amounted to only about 14,000 tons, had risen by 10,000 tons by the third week in June, and to-day the coal is coming in well. These are only examples of information to like effect in our possession; so that our friends in the North who would like us to minimize the difficulties there have been, and the difficulties that in several places there still are, in connection with gas undertakings, and do something to try and moderate the directness of the appeal to Parliament, will see that the gas industry is not without good cause in the attitude taken up in regard to the general question.

But while our colliery correspondent assures us that he has no difficulty with regard to the contracts that he has running with gas-works, he admits, in an earlier part of his letter, that, during the first six months of the war, "great "difficulties" were created. But he casts the blame for this on to "contractors not taking out their quantities, and thus "depleting their stocks." He proceeds: "This has no doubt "caused the greater part of the trouble, and, in addition, has "been a very serious loss to the different coal companies "whose collieries were left standing while the gas companies "were using up their stocks. You will therefore agree that "the difficulties have not been caused by the collieries." We can hardly consent to any such complete endorsement; and a reason will be given presently, and one which ought not to be left without a full and searching inquiry on the part of the Government. Concerning our correspondent's submission as to "contractors" being the cause of the greater part of the trouble and of loss to the collieries by not taking their contract quantities of coal, we should like to ask him whether he really thinks that gas-works would, could they have obtained deliveries of coal, have pursued such an uneconomical course as to work from stock, and deplete stock to the extent that they were compelled to do? They, like certain of the more reputable coal factors, could not get the coal they wanted transferred from the North; and, in consequence, every possible form of pressure was brought to bear not only on collieries (northern and others), shipowners, and railway companies, but upon the Government, with the view to getting them to assist in relieving the position. But things went from bad to worse. Surely these conditions are not altogether unknown to our correspondent.

Beyond these conditions, after the drop in coal exports at the beginning of the war, month by month, the exports from the North increased. This is shown by the monthly returns of the Board of Trade; and, moreover, it has been pointed out in the House more than once that supplies of coal from the North to certain of the neutral countries were greater than in the corresponding months of the preceding year. At the time when many home gas-works were face to face with a most perilous position, captains of their boats had the mortification of seeing shipload after shipload of coal sailing away under the flags of neutral countries, while they were waiting for supplies for home use. Had the embargo on coal exports to neutral countries taken place quite early in the year—say, about Jan. 1—there would have been much more coal available for the United Kingdom and our Allies; and gas-works would have been not only willing but eager to replenish their terribly reduced stocks. Any colliery

owner who would try now to throw the blame upon gas-works for the difficulties that arose some months ago, and for those that have issued from them, would find it hard to explain, in conjunction with the accusation, how it is that, following the coal export prohibition, with less men working in the mines than in the war months of last year, the stocks of the London and other gas undertakings supplied by water have largely increased. One result of this greatly improved supply is that carburetted water-gas makes are being diminished, and a larger quantity of coke is being produced for the market.

There is yet another matter. Had the coal export prohibition taken place earlier, the very boats that were carrying coal to neutral countries would have entered into competition for the home conveyance of coal, and so would have brought about a reduction of the rates of freight, as they have done since the Exports Committee have been at work, with the result that freights have receded to 7s., compared with (say) 17s. at the beginning of the year. If 7s.—nearly twice as much as the rate before the war—had ruled throughout, the collier owners would have reaped a handsome profit, and things would have been altogether different. It is, indeed, just possible that the release of boats running to neutral countries would, with the interned boats, have kept the rates for freights from the Tyne to London much nearer normal than even the 7s. Supplies of coal, too, with earlier export prohibition, would have been plentiful from the North; and the price of gas to the consumers would not have had to be raised to the extent that was the case through the conditions which then prevailed, and which conditions were the means that enabled the contract prices of coal to be raised to the present levels, and which prices will now prevent an immediate return to lower charges to the gas consumers. These are facts that cannot be dismissed by general statements, or by any confession of ignorance as to the state of things that brought the stocks of British gas-works down to such low and alarming levels at the greatest height of their winter need.

Under the circumstances, in our opinion, and in that of other people, there ought to be very strict Government inquiry in order to ascertain why it was there was an increasing amount of coal passing from this country to certain neutral countries during last winter when all home industries were crying-out for supplies, and as to the ultimate destination of a large part of the coal. It was admitted by Government representatives at the time the Export Regulations Committee were appointed that fears existed that some of the coal exported from this country was destined for enemy countries; and the little public protest that there has been (whatever there may have been privately or indirectly) from the colliery owners against the restriction placed on exports to neutral countries, gives colour to the idea that the colliery owners must have known that, though they were not directly trading with the enemy, all the coal that was passing to neutral countries was not required for the current needs of those countries—at any rate, there is no evidence that colliery owners tried to satisfy themselves on the point. Can any reasoning individual doubt the ultimate destination of much of this coal? There is ground for fear that what Sir Charles W. Macara, the late Chairman of the Federation of Master Cotton Spinners' Association, has said with reference to cotton applies with equal force to coal—any way up to the middle of May. He writes:

> I am afraid the British Government does not yet fully appreciate the importance of preventing cotton, which is the main factor in producing high explosives, from reaching enemy countries from any part of the world. Large quantities of cotton have filtered through neutral countries to both Germany and Austria. . . . Until a few months ago aëroplane cloth, which is so largely made in Lancashire, was undoubtedly getting to enemy countries through neutral countries; and it is a question if this is entirely stopped to-day.

The captains of British colliers were strongly of opinion that a large amount of the coal which was being loaded into neutral ships at North-East coast ports was, well into May, passing over the German borders. Colliers flying the British flag were somewhat rare. It is indeed hard to understand why Holland, with an army half (or more) mobilized, should be receiving coal carried by about five times the number of colliers flying the Dutch flag that it had in times of peace, and why Scandinavia and Denmark, with their armies partially mobilized, should to-day be receiving coal by about three times the number of colliers flying the flags of Norway, Sweden, and Denmark than were running in normal times. If, as is the opinion of captains of British colliers, a large proportion of this coal was finding its way into German hands, then (may be in an indirect way) it was being converted into ammunition for use against our own forces and those of our Allies—at all events, it was benefiting a country at war with us. It should be an easy matter now to gather information from the captains of colliers as to what was going on; and it should not be difficult, through the agencies at the command of the Government, to trace out those who were engaging in this trade. The Board of Trade—the appointment of the Coal Exports Regulation Committee proves it—had their suspicions aroused. But the Board were apparently slow, or too busy, to grasp the truth of a matter that was brought to their notice in January until they made the move which began to have good effect about the middle of May.

We repeat that this is a matter into which there ought to be a very thorough inquiry by the Government—not only because these exports partly account for the high prices that have been charged to many gas among other enterprises, and meant the removal of coal from this country when there was a shortage here, but because the question is one touching national interests in the most critical period of our country's history. Those interested in collieries must really not think that there is only one source of information about coal matters, and that source themselves. If they nurse such a belief, they are simply deceiving themselves.

Early Gas-Fire Installation this Year.

To talk of gas-fires in the early days of summer is seemingly to show a disregard of the fitness of subject to time. But it is not so this year; for if ever there was a time in which we should "take thought" and look well ahead not only in the matter of supplies of coal and other materials but of gas-consuming goods for stock and early installation, it is now. We cannot tell what next winter will bring forth, when the full effects of the depletion of labour will be felt in all lines and branches of industrial and transport work.

In the gas industry, we have adopted as an ideal in domestic heating, "a gas-fire in every room of every house." Such an ideal is the *Ultima Thule* of this particular matter; and we are fully conscious that it is an ideal that will be long before it is reached. But in any walk or business of life, it is well to have an ideal to attain which will require constant and protracted perseverance; for every step made towards it gives additional encouragement and incentive, and so greater accomplishment is realized. In recent years, gas-fires have gone ahead in adoption for household purposes at a remarkable rate; and, as a result, the ideal which has appeared so unattainable has had some of its cloaking of impossibility torn off. This being so, we must not allow the war to undo or even depreciate the valuable work achieved in connection with domestic gas heating during the years immediately preceding the war, but must still persevere so that there is continuity in the work. An interruption in developing efforts at the present time would surely mean that much of the influence of what has already been done would be largely destroyed; and it would in the result be necessary to restart after the war a long way back on the road of which a good distance has previously been traversed. This would never do. The gas industry has to contend with very powerful interests in this matter of supplanting, by scientific means of heating, air-polluting solid fuel; and it must not neglect the electricity supply industry with its so-called electric "fires," which are to depose the old lamp form of electric-radiators.

As was seen in the "Point-Five" paper referred to in "Electricity Supply Memoranda" last week, assent is now given by electrical engineers to what we have long known to be, and what experienced readers knew was, a fact—that the old form of electric radiator was very uneconomical and inefficient as a heating agent, and that the occupants of a decent sized room fitted with such a radiator (forgive the misuse of the term) could not enjoy any warmth from it, except by sitting one at a time in the path of the radiations from the lamps, and then the person so sitting could only enjoy the sensation of warmth on the side of his or her structure that was exposed to the radiations. One of the four-lamp radiators of the old type required a unit of electricity per hour. That type has had its day; and a new form—with incandescent bars—is now being recommended, although absorbing some 3 or 4 units per hour. The electrical industry has learned the lesson that a sufficiency of heat cannot be given without there is a sufficient expenditure of energy.

Such expenditure, however, with electric-fires means a heavy running bill; and the higher working temperature results in more rapid destruction and greater maintenance costs for a fire which is expensive initially. Nevertheless the new fire offers to the electricity industry the only hope of retaining a little heating connection; but it will still be "little" owing to uneconomy. However, the electrical industry is going to push these fires as much as it can. But fortunately the gas industry has more efficient means—efficient both as heating and ventilating agents, and cheaper in first cost, and lower in maintenance and running costs.

With such merits on the side of the gas-fire, there is no fear of competition; but it is necessary that this year an early start should be made in urging consumers to send in their orders for gas-fires, and have them installed now and onwards before actually being required for active service. The work of fitting gas-fires must be commenced betimes this summer. The cry of many gas managers during recent winters has been for a larger number of efficient fitters; and the great thing this year will be to make the utmost possible of the fitters who are now available for the work by spreading the fixing of gas-fires over as long a period as can be arranged in collaboration with householders. To bring this about, householders should at once be the recipients of circular letters, pointing out the advantages to them of placing their gas-fire orders in good time. Doing so, they should be informed, will ensure them getting the installation work done in view of the scarcity of fitters, owing to the thinning-out of the ranks by the claims of the country; and they will be also assisting in lightening work made heavier by the war. Furthermore, the early provision of gas-fires will be a prudent preparation for a winter in which coal is likely to be costly and scarcer than it was last winter. They might also be reminded that for the coming winter large coal provision has been made by the local gas undertaking, and that gas for heating will therefore always be "on tap."

Coal Deliveries under Old Contracts.

Up to the time of writing, Mr. Runciman has not been in a position to make an announcement as to what the Government propose to do as to the regulation of coal prices; but the past week saw the official smoothing-out of the difficulties in South Wales between the miners and the owners, through the intervention of the Board of Trade. Unfortunately, however, there was large discontent among the miners over the settlement; and, at the end of the week, a number of pits were idle. In connection with the question of Government regulation of coal prices, the gas industry is being singled-out by the coal owners for special attack. Sir Joseph Walton, M.P., is a good example of an attacker; and his words instance the false notions entertained as to current coal supplies to the gas industry. He recently told the Parliamentary Coal Supplies Committee that gas undertakings were still receiving coal under their old contracts at low prices; and the colliery owners were supplying this coal at a loss, though the gas industry was receiving high prices for coke, and colossal prices from the Government for such products as toluol. This is a one-sided tale; and its omissions, as every gas man knows, make it very untrue.

Causes and Effects.

That coal is still being delivered under old contracts is due to various causes—viz., the large quantities of coal exported last winter (part of which ought to have been retained to fulfil home contracts), the large quantity of coal which found its way into the open market instead of to the works of contractors, and the trouble there was last winter with both railway and ship conveyance. Gas undertakings are not really making anything out of the position by having deliveries now under the contract prices of 1914-15. As a matter of fact, when coal proprietors were selling dearly in the open market not so very long since, the gas undertakings had to buy (as Sir Joseph Bellamy explained at the Plymouth and Stonehouse Gas Company's meeting the other day, as reported in this issue) at the price asked, wherever coal could be obtained, in order to keep their works going. It was not a question for their decision as to the price to be paid. They had to pay what was demanded; and some one interested in coal pocketed the unreasonable profits. This condition is a set-off against now receiving coal under old contracts. Then as to the price of coke, it is higher; but a couple of tons of coal have to be handled and carbonized before a ton of coke is obtained for sale. As to the "colossal" figures being paid for toluol, this is an exaggeration. The small percentage paid by the Government on working costs is anything but "colossal." Gas undertakings, despite all Sir Joseph Walton drew from his imagination as to their position, have not been able to make both ends meet without increasing the price of gas; and shareholders in gas companies have, in consequence, suffered a heavy fall in the rates of their dividends. Low gas-priced companies like Sheffield, Plymouth, and Wandsworth have had to advance their charges to gas consumers owing to the price of coal; and we should not be astonished to receive intelligence at any time now that Widnes has followed suit.

Direct Recovery in Gas-Works.

Reading the reports of the District Inspectors under the Alkali Works Regulation Act [extracts from which are given elsewhere], one cannot fail to be struck by the several references to the adoption of the direct sulphate of ammonia process for ordinary gas-works purposes. It is clear that good progress is being made in this direction. In the report dealing with the South Midland and Norfolk district, it is stated that five such plants are in operation in the area. They appear to give every satisfaction; and the salt produced is of good colour. In the South and South-West of England, of four reconstructions of plant two are on the direct method, and five new registrations are all on this system. In the North of England report, it is stated that the direct system continues to give satisfaction at the one gas-works where in use. In Scotland, little progress has as yet been made with the direct process in gas-works; but Ireland boasts of one such plant. The facts given above indicate that a sturdy commencement has been made with the introduction of the direct sulphate of ammonia system into gas-works; and it is pretty safe now to prognosticate a large future for it.

The Nitrate Half Year.

A few generalities and figures which can do no harm are admitted by Messrs. W. Montgomery and Co. to form the constituent parts of their report on the nitrate of soda market during the past six months. The reason for this is two-fold—the impossibility of obtaining correct information as to deliveries and stocks on the Continent, and the wish not to publish anything which might be of the slightest value to the enemy. It is remarked that at the commencement of the year an impression prevailed that nitrate for this country would be in superabundance during the spring. In the event, however, while there was a sufficiency, there was at no period too much. A great deal of it was transhipped to Russia, and some to France and Holland. But, in spite of the numerous difficulties which had to be surmounted, the firm express the opinion that, though it is hardly possible to give reliable data as to consumption in the United Kingdom for agricultural purposes during the past six months, it has not decreased. Naturally, for use for explosive purposes, there has been a considerably increased demand. Prices throughout the season have had a continuous advance. Nitrate which in January was obtainable at 5s. 9d. per quintal f.o.b. Chili, prompt shipment, now commands 6s. 10½d., with about 2d. per quintal more for forward shipment. Monthly parcels over 1916 have, it is stated, been sold in considerable quantities at 7s. per quintal, with sellers holding for rather more money. The production for the past six months [estimating the June output], shows a decrease, when compared with the same period of 1914, of no less than 62 per cent. In the same time, the shipments to Europe have amounted to about 355,000 tons, against 832,000 tons last year, or a decrease of 477,000 tons. As to the future, the firm point out that, even after the termination of the war, there must necessarily for a time be much employment for tonnage, while there is also the probability that a freer market for nitrate might bring about an advance in the article itself in Chili. Should hostilities continue six or eight months longer, they conclude, then it is very doubtful whether nitrate will be cheaper for next spring delivery than it is to-day; and it might easily be dearer.

Economy and National Finance.

In these critical times, when colossal liabilities are being built up, we are asked to place ourselves under rigorous control and restraint. If not of military age, we are requested to enrol for

munitions work. All the units of our population between the ages of 15 and 65 years, irrespective of sex, are now to compulsorily register, in order that an assessment may be made of what the nation is capable of doing. The Premier, too, has started a big campaign, for promoting national economy, in order to make thrift the source for the provision of a large part of the war loan. This is all good and necessary; but it must not be carried beyond the borders of sanity. Carried too far, we should suffer nationally, and undermine the real resources of the country. While we are organizing for the war, of course everything else must be subordinated to the main object, so long as the main object is not detrimentally affected by the subordination. Industry and commerce are the bed-rock of our material and financial power; and it would be folly indeed, in the cause of the main object, to disorganize industry to such an extent as to deprive it of the vital power to its sufficient maintenance; for from it the "sinews of war" have to be produced. Such disorganization would be the worst possible thing in the interests of the country. The realization of the desire of industrial men to serve, in one way or another, in the great struggle, and the special financial regulation that there is to-day in some directions, must have their limits, or there will be a grave necessity shortly to start reorganizing things at home, in order to prevent a collapse, through oversapping, of some of the very sources of the nation's strength. Luxury and waste have been indicted. This is right; requirements must be restricted to necessaries. But what is called "economy" could be pursued to such a length as to altogether upset the national economic situation. Mr. Asquith says expenditure must be diminished, and savings increased. If more can be saved, more can be lent to the State.

The Money-Producing Sources.

But the financial needs of the State are, through the war, four and more times greater than in normal times, and these needs will be continuous for some time to come. Whence is this continuous flow of money to come if we are to fight to a victorious end? The Premier answers, "If you spend less, you either reduce the cost of imports, or you leave a larger volume of commodities available for export." The argument is sound; but it has its bounds. It is sound so far as it means less indebtedness to other countries, a larger business with and income from other countries, and relieves pressure at home occasioned by the scarcity of certain commodities. But if a too stringent economy, through the reduction of home consumption and use, injures important profit-producing national industries, we cannot help thinking that the country itself will be harmed and its financial strength weakened. Gas is an economy-producing agent, through the reduction of labour that it effects in the household. It produces economy, too, when used for heating in lieu of coal by preventing the destruction of valuable commodities. If people carried economy to excess in connection with the use of gas, the profit producing and circulating power of the industry would be depreciated, and so would be the power to financially help the nation. The ability of the industry to produce raw materials for other industries would be reduced; and so would be the power of the industry in relation to the yield of ingredients for the making of ammunition. Economy is correct; but only so long as it contributes to the financial strength of the country. When it affects its money-creative power, then it is not right, and more particularly at a time when the drafts upon the money-producing resources of the country are of unprecedented magnitude.

War Badges for Workers.

Touching the discussion which took place on this matter at the last meeting of the Institution of Gas Engineers, and the refusal of the War Office to give official authorization to such a badge for gas workers [see Mr. Dunn's letter in the "JOURNAL" for June 15], it is interesting to note that, during the Committee stage of the Munitions Bill, a new clause was inserted enabling the Minister of Munitions to make rules authorizing the wearing of badges or other distinctive marks by persons engaged on munitions work or other work for war purposes, and to prohibit the use of unauthorized badges. The last few words rather knock on the head the use of a distinctive badge by gas workers, unless Mr. Lloyd George gives due authorization to them. Perhaps, however, in view of the valuable contribution that gas-works are making to the provision of materials for the production of high explosives, and the part they are taking in the provision of light, heat, and power for factories engaged in the turning out of munitions, Mr. Lloyd George may open his heart, and allow unsparable skilled gas workers to come within employment upon "other work for war purposes, and so enable them to wear badges."

PERSONAL.

MR. DOIG GIBB'S RETIREMENT.

In connection with the retirement of Mr. W. DOIG GIBB from the position of Chief Engineer of the South Metropolitan Gas Company, the workmen members of the Co-Partnership Committee recently assembled in the Livesey Institute in the Old Kent Road, to present him with a handsome illuminated address, subscribed for by the workmen of all stations and depôts.

Mr. W. Beard voiced the universal regret felt at the news of the retirement of Mr. Gibb, who, he said, had gained the esteem and regard of every workman in the service of the Company. They all looked upon him as a friend; and every workman at every station had contributed to the cost of the address, which they presented as an evidence of their good feeling. Other speakers having borne testimony to the cordiality of the feeling of all ranks towards Mr. Gibb, the address was read by Mr. Beard and formally presented.

In acknowledgment, Mr. Gibb mentioned that his retirement was occasioned by his being completely run-down. It was one of the proudest moments in his life when he was told that he had won the regard of the workmen as well as the staff; and he was grateful indeed for this tangible token of their goodwill. He was as sorry to part with the men as they were to lose him. His relations with them had always been pleasant, and he had found South Metropolitan co-partners to be a sensible and reasonable set of men. He felt that in leaving them he was parting with real friends.

The proceedings closed with the singing of "For He's a Jolly Good Fellow," and hearty cheers for Mr. and Mrs. Gibb.

It is understood by the "Co-Partnership Journal of the South Metropolitan Gas Company" that the testimonial raised by the staff officers has taken the form of a silver rose-bowl and candelabra, and that, in deference to the state of Mr. Gibb's health, it has been arranged for the presentation to be private.

Mr. CHARLES C. SEYMOUR has been appointed Assistant Manager of the Weston-super-Mare Gaslight Company.

Mr. JOSEPH WILLIAMSON has resigned the post of Gas Manager to the Arlecdon and Frizington Urban District Council.

Mr. H. B. KNOWLES has been appointed Assistant-Manager at the Darwen Corporation Gas-Works, in the absence of Mr. ALAN BERRY, who has joined the Mechanical Transport of the Army Service Corps.

Mr. SAMUEL MOORE, Manager of the Dromore (co. Down) Gas-Works, has been appointed Manager of the Portrush Gas Company, in place of Mr. J. W. M'Lusky, who was recently put in the charge of the Airdrie Gas-Works.

Company Sergeant-Major FREDERICK BARTER, of the Special Reserve, attached to the 1st Battalion of the Royal Welsh Fusiliers, who is an employee of the Cardiff Gas Company, has been awarded the Victoria Cross for most conspicuous bravery and marked ability at Festubert on May 16. When in the first line of German trenches, he called for volunteers to enable him to extend the British line; and, with the eight men who responded, he attacked the German position with bombs, capturing three German officers and 102 men, and 500 yards of their trenches.

At their meeting a week ago, the Biddulph Urban District Council had before them a letter from Mr. H. SIMCOCK tendering his resignation as Manager of the gas-works, unless the Council were prepared to accede to his demand for an increase of his salary to £104 per year. The matter had been referred to the Council by the Gas Committee, and was discussed by them in private. The announcement was subsequently made that Mr. Simcock's resignation had been accepted, to take effect from the meeting; and that he would be paid a month's salary.

Mr. G. GERARD WILSON, elder son of Mr. John Wilson, of Hagley Road, Edgbaston, has been granted a commission in the 3/8th Warwickshire Regiment. Born in 1892, Mr. Wilson was educated at Edgbaston Preparatory School and King Edward's High School, New Street, and showed promise as a good all-round athlete. In 1912, he won the Silver Medal (highest award) in the Final Examination in "Gas Engineering," and until September last was an Assistant-Engineer at the Saltley Gas-Works of the Birmingham Corporation. He then joined the 1st Birmingham Battalion, and has since been in training at Sutton Coldfield.

Mr. J. C. WRIGHT, late of West Ham, has been appointed Assistant-Manager to the Grays and Tilbury Gas Company, in consequence of Mr. J. H. Hornby's absence at the front. Mr. Wright received his training under his father (who was Engineer of the Bromley works of the Gas Light and Coke Company),

previous to entering the service of the West Ham Gas Company. At West Ham, he was for two years Assistant-Engineer to Mr. E. H. Thorman, four years to Mr. J. Thorman, and thirteen years to Mr. John Clark, upon whose death Mr. Wright was appointed Acting Engineer until the amalgamation. During his time there, the works were re-modelled, and considerable extensions undertaken; and the make of gas increased from 603 to 2007 million cubic feet, in spite of the competition of three Corporations supplying electricity in the Company's district. The Grays and Tilbury works are thoroughly up-to-date, with vertical retorts, water-gas plant, &c. There is a run of about 21 miles of high-pressure main, from which the surrounding rural districts are supplied.

It will be seen from the news columns of this issue that on the retirement, after 46 years' service, of Mr. WILLIAM FORD from the management of the Stockton-on-Tees Corporation Gas-Works, Mr. MATT. DUNN, who for over twelve years has been Assistant-Manager, has been appointed to succeed him—Mr. Ford, at the same time, being made Consulting Engineer. Mr. Dunn, who has for years taken an active interest in gas matters generally, and has been a keen lecturer on these and allied subjects, is a Past-President of the North of England Gas Managers' Association, a past member of the Council of the Institution of Gas Engineers, and a member of the Institution of Mechanical Engineers; and besides many certificates and prizes in engineering, drawing, steam, and mechanics, he holds an honours diploma in gas manufacture, supply, and distribution. After having been articled to Messrs. Ashmore, Benson, Pease, and Co., he was appointed, in 1893, Manager of the Selby Gas and Water Works, and carried out there extensive alterations and additions. Five years later, Mr. Dunn took up a similar position at Goole, where he also was responsible for a great deal of work. His next move was in 1902, when he went to Stockton, and has since remained there.

The position of Gas Manager at Droitwich (rendered vacant by the removal of Mr. F. Shewring to Tawe Valley) has been filled, from among eighty odd applications, by the appointment of Mr. REGINALD THOMAS, the Secretary and Manager to the Minehead Gas Company, Limited; and he will take up his new duties the beginning of next month. Mr. Thomas was first employed for seven years, under his father, at the Wellington (Somerset) Gas-Works, where he acted as office and works assistant. On leaving Wellington, he went to Woking, serving there for three years under Mr. W. H. Ely, during which time the works were practically remodelled, and large extensions of mains took place. Mr. Thomas has been at Minehead for nearly six years; and the make has increased from 17 to 26 million cubic feet per annum. Many additions to the plant have been made, including a retort-bench, washers, scrubbers, purifiers, and a boosting plant—the last named to cope with the "season" demand, which is becoming very great. Appliances at the rate of 200 a year have been fixed; and a large number of water-heaters have been installed, mainly due to the opening of new offices and show-rooms in the centre of the town. The capital has been increased from £9000 to £15,000, and the dividends from 7 to nearly 9 per cent., in spite of keen competition. The Electricity Company have twice been challenged by Mr. Thomas to substantiate their claim that electricity is cheaper than gas for cooking; but on both occasions they failed to take up the challenge. Mr. Thomas holds an honours certificate in "Gas Manufacture and Supply."

OBITUARY.

The death is announced, at Wilmslow, in his fifty-ninth year, of Mr. HAROLD NICKSON, the head of a large firm of coal dealers in the Manchester district. He was a son of Mr. Charles Nickson, formerly Superintendent of the Manchester Corporation Gas Department, who survives him. The late Mr. Nickson was a Founder and the first Master of the Lord Stanley Lodge of Freemasons. His death, which followed upon an apoplectic seizure, is deplored by a wide circle of friends.

It is announced in the "Journal für Gasbeleuchtung" of the 19th ult. that the death occurred on June 7, from an apoplectic seizure, of Herr KARL PFUDEL, the Manager of the Charlottenburg Corporation Gas-Works. Deceased, who was in his sixty-seventh year, had fought as a volunteer in the Franco-German war of 1870-71. He had been an active member of the German Association of Gas and Water Engineers, and an especially active supporter of the affiliated Brandenburg District Association.

The "Zeitschrift" of the Association of Gas and Water Engineers of Austria and Hungary of the 15th ult. reported that M. ISIDOR BERNAUER, the Manager of the Budapest Corporation Gas Undertaking [a first instalment of whose description of the new Budapest Gas-Works will be found on a later page of to-day's "JOURNAL"], has lost his son, M. MARCELL BERNAUER, a Lieutenant in the Reserve, from wounds received in battle at Lisowice in Galicia, on May 19. Lieut. Bernauer, who was an engineering assistant at the Royal Josephs' Polytechnic at Budapest, had earlier been decorated for bravery in the field.

The death has occurred from enteric, at the Alexandria Hospital, of Mr. H. P. ADCOCK, who was attached to the Divisional Engineers of the Royal Navy serving in the Dardanelles. Mr. Adcock (who was Junior Assistant and Chemist to Mr. F. W. Cross, the Engineer and General Manager of the Lea Bridge District Gas Company) served his articles with Mr. A. E. Broadberry, at Tottenham, and joined the Lea Bridge Company in 1912. He was a student of the Institution of Civil Engineers, and just previous to leaving for the Dardanelles obtained a few days' leave, which he spent in sitting for his examination for associate membership of the Civils; and at the same time he got married. His death is deeply regretted by all who knew him.

GAS COOKING AT INDIAN HOSPITALS.

A batch of interesting photographs—one of which is reproduced to-day—has been forwarded by Mr. Philip G. G. Moon, the Acting General-Manager of the Bournemouth Gas and Water Company, showing some of the gas cooking apparatus at the Indian hospitals at Barton-on-Sea and Milford. These hospitals accommodate about 1200 Indians; and all the cooking is done by gas. There are fixed 740 ring-burners, 20 large double cookers, and 16 gas-heated boilers. The gas for the supply of the hospitals is produced at the Bournemouth Company's Poole works, some 20 miles away from where it is consumed.

A KITCHEN OF RING-BURNERS AT THE MARINE HOTEL, BARTON-ON-SEA.

GAS LIGHTING AT THE PANAMA-PACIFIC EXPOSITION.

For the two exceptionally good night photographs of high-pressure gas lighting at the Panama-Pacific Exposition reproduced here, we are indebted to Mr. George G. Ramsdell, the Secretary of the American Gas Institute, who received them from Mr. E. C. Jones, of San Francisco, the President. An idea of the nature of the lighting will be gathered from these pictures. Those responsible for the arrangements feel justified in claiming that there has never been a more instructive display of the usefulness of gas for lighting purposes than is now in constant operation at the exposition. In addition to this, gas is also being used in all parts of the grounds for culinary and other fuel purposes.

One of the photographs shows the Netherlands building looking west on the esplanade, with the Massachusetts building, which is a reproduction of the State House, in the distance. On both sides of the esplanade are rows of high-pressure gas-lamps, giving a mean lower hemispherical candle power of 1160 candles each. This picture was taken during a reception given in honour of the Governor of New York, and shows a number of automobiles parked. The first limousine is so brilliantly lighted by the gas-lamp immediately over it that the interior fittings of the car are easily discernible.

The second photograph is a view of the west end of the Palace of Fine Arts, looking toward the French Pavilion. This place is entirely lighted by gas; and there will be noticed the remarkable flood lighting of the building and the statuary in the foreground.

Purification of Producer Gas.—Writing in a recent issue of "The Iron Age," Mr. A. J. Wallace dealt with the removal of sulphur from producer gas. The author pointed out that gas purification from the standpoint of the steel trade involves the question of whether the sulphuretted hydrogen can be removed from producer gas at a low cost. This he answered in the affirmative, and stated that at gas-works sulphur purification is the lowest cost on the list—ranging from 0·0005d. to 0·001d. per 1000 cubic feet, depending upon the sulphur content, methods employed, &c. The material is used in the form of iron sponge, representing a mixture of the oxide with shavings, coke breeze, or anything of like character. Until recent years, the usual installation consisted of four cast-iron boxes, rectangular in form, and varying from 3 to 6 feet in depth. Modern practice has, however, veered towards exposed steel cylindrical purifiers, which can be erected at a much lower cost. The modern type of purifier is 10 or 12 feet in depth, and carries two and sometimes three layers, as compared with one, or two at the outside, in the older boxes.

THE EXAMINATIONS IN "GAS ENGINEERING" AND "GAS SUPPLY."

List of Successful Candidates.

THE pass-lists for the last City and Guilds of London Institute examinations in "Gas Engineering" and "Gas Supply" have been sent to the Institution of Gas Engineers; and they have been forwarded to us by Mr. Walter T. Dunn, the Secretary, for publication. The questions set by the Examiner in the first-named subject—Mr. Samuel Glover, of St. Helens—were given in the "JOURNAL" for April 27, p. 217; and those put by Mr. Walter Hole, of Leeds, on "Gas Supply," will be found in the succeeding issue. The names of the prize winners will probably be announced in the course of a few weeks.

GAS ENGINEERING.

FINAL GRADE.

First Class.

Berry, Richard
Booth, James H.
Burr, James
Butterfield, John A.
Claridge, Wilfred B.
Cornish, James H.
Fairclough, Herbert
Hoskins, William A.
McQuillan, Arthur J.
Mills, Albert H.
Muddiman, Ernest W.
Noble, John H.
Norman, Colin
Payman, William
Postlethwaite, Wm. H.
Probert, Edward H.
Riddell, Keith O.
Roos, Alfred
Rust, Joseph F.
Sugden, Wallace
Thomas, Leonard H.
Townend, Frank S.
Turnbull, William
Ward, Cyril G.
Weeks, Rodney C.
Wilson, John

Second Class.

Arthur, Edward
Banford, Frank E.
Barnett, Walter A.
Battersby, Walter
Connolly, Albert W.
Davidson, Alexander N.
Dean, Harry W.
Duncan, Clifford
Elsby, Ralph W.
Eve, Edgar W.
Gandon, Kenneth C. R.
Garrett, George S.
Haynes, John T.
Kaye, Elliott
Prentis, Arthur E.
Poulson, Joseph
Reed, William H.
Sharpe, William
Tonge, Edward C.
Wilson, Alfred C.

GRADE I.

First Class.

Adams, Leslie
Allan, Oswald
Beddow, Clarence
Black, Thomas
Brown, Hubert H.
Clarke, Claude H.
Cooper, James F.
Ekins, Harold E.
Evans, Joseph L.
Ewing, William
Foster, Sidney
Hargreaves, Harry
Harris, Arthur
Hefferman, John
Hepworth, Joseph A. L.
Hickson, Charles E.
Higgs, John N.
Hunter, Frederick S.
Ingham, Charles R.
Jones, Edgar
Keene, Hugh
Knowles, Hubert B.
Lee, Frederick C.
Macnaughton, William
Mooney, Frederick F.
Newby, Charles H.
Ogden, George
Palmer, Charles W.
Plagerson, Reuben
Rearden, Patrick J.
Ridout, Percy B.
Robinson, Cecil J.
Shepherd, Harry
Sparkes, Joseph
Vickers, Ernest
Wills, Albert J.
Wise, William H.
Wood, George W.

Second Class.

Appleyard, Norman G.
Bainbridge, Edwin
Banyard, Alfred
Barstow, Stanley
Battersby, Thomas C.
Berry, Samuel N.
Butcher, Thomas
Carter, Walter J.
Charlesworth, John W.
Charnley, William C.
Cronk, Leonard A.
Deane, Cedric
Dodd, Allan P.
Easton, Frank
Frost, William H.
Gardner, Joseph
Gerrard, Joseph D.
Hopkins, Frank J.
Hyde, John
McLauchlan, William
Mason, Thomas
Mercer, Arthur
Moss, John
Ogden, Samuel
Parkin, Lawrence
Parrish, John
Preston, John F.
Rooney, Patrick J.
Rowarth, Maurice J.
Speedy, Alan
Stainforth, Fred.
Stanley, Wilfrid E.
Stanton, Leonard V.
Thomas, Harold R.
Tubb, Joseph
Wadsworth, Harry
Walsh, Patrick J. J.
Winters, Harry
Young, William

GAS SUPPLY.

FINAL GRADE.

First Class.

Abbott, Allan
Bailey, Edward
Bellingham, Arthur D.
Booth, James H.
Caesar, Augustus G.
Canlett, Frederick R.
Champion, Alexander J.
Davidson, Alexander N.
Gladstone, William E.
Gregson, James
Griffiths, Thomas
Harris, Thomas W.
Haynes, John T.
Hems, Harold R.
House, George
Howe, John S.
Humphries, Arthur W.
Isaacks, George E.
Jones, Hugh
Lathrope, Frank H.
Longstreeth, Percy D.
Mann, William C.
Manning, Albert H.
Mills, Albert H.
Morton, Douglas
Muddiman, Ernest W.
Oliver, George
Owen, Thomas L.
Perry, Thomas
Price, Howard W.
Roberts, Arthur
Rudge, John
Shore, Charles L.
Tilston, Joseph H.
Thomas, Leonard H.
Townend, Frank S.
Westbrook, William J.
Williams, John
Wilson, John
Wolfe, Thomas A.
Wood, Frederick W.
Young, Donald

Second Class.

Ashwood, Francis W.
Bateman, Frank
Bewsher, Bryan
Broadfield, Frederick E.
Church, Ernest H.
Christie, Frederick G.
Cottle, Ernest A.
Cotton, Ernest J.
Crane, Charles
Davison, Henry H.
Dicker-Jones, Thomas
Duxbury, James B.
Felby, George
Fotherby, Robert C.
Gardner, William A.
Haley, Henry
Hector, Albert
Hester, James D.
Higgs, John N.
Holmes, George
Hopkins, Frank J.
Hood, John
Jackson, Thomas
Jenkins, Ifer G.
Kenshale, William T.
Lambert, Thomas
Lamond, Alexander W.
Leary, Peter H.
Manwaring, Percy
Newby, Edgar J.
Norman, Colin C.
Park, Harold G.
Parry, George J.
Pennell, Harry G.
Pennington, Jesse F.
Phelps, Leslie J.
Poulson, Joseph
Snowdon, Thomas M.
Squires, Ernest H.
Stooke, Sidney R.
Stopp, George
Tansley, William H.
Taylor, George
Taylor, Walter
Vickers, Charles E.
Vigor, John G.
Wardle, Thomas J.
West, George W.
Westworth, James K.
Wright, Charles T.
Yates, William M.

GRADE I.

First Class.

Amor, Ferdinand J. C.
Anderson, Ivan
Andrews, Hubert A.
Barlow, Alfred
Bates, Walter
Battersby, Thomas C.
Belton, Francis W. J.
Bishop, William E.
Blake, George W.
Brice, Clement C.
Bolton, Wilfred
Booth, John A.
Butcher, Thomas
Caesar, John E. V.
Carr, John T.
Carter, Walter J.
Chaston, Robert S.
Churn, Albert E.
Cole, Herbert K.
Collingbourne, John H.
Coppack, John
Creak, Henry P.
Deane, Cedric
Digby, Walter C.
Duffield, Oliver
Eabry, Richard G.
Evans, David W.
Evans, John R.
Eves, Eric B.
Ewing, William
Feltwell, Frederick H.
Foster, Edmund M.
Foster, Sidney
Gerrard, Joseph D.
Glanville, Percy J.
Glass, Henry F.
Gosling, Gerald
Hancock, William
Harris, William J.
Harvey, Claude
Heath, John
Helyar, Ernest
Henton, Albert E.
Holt, Harold D.
Hunt, Archibald A.
Hunter, Frederick S.
Hyde, Joseph P.
Jack, Han
Jones, Edward R.
Jones, Elias J.
Jones, Samuel W.
Kenner, John A.
Knowles, Hubert B.
Lamb, John C.
Macnaughton, William
Mason, Thomas
Mercer, Arthur
Morgan, Leslie G.
Moult, George E. W.
Moult, Harry
Murray, Stephen
Nelson, William
Nicholson, Ernest
Osland, Herbert J.
Parker, Alfred J.
Parry, William I.
Perridge, Christopher F.
Phelps, Gilbert C.
Pickett, Edgar
Platt, Arthur H.
Robinson, Cecil J.
Rutherford, Henry
Sadler, Francis
Shuttleworth, Arthur
Simpson, John
Skuse, Edward J.
Smith, Frederick
Soper, John H.
Spencer, Ernest
Spurgeon, Charles E.
Sugden, Wallace
Thomas, Arthur J. O.
Thomas, Harold R.
Thompson, Henry
Tilley, William T.
Turner, John A.
Turner, Samuel J.
Turner, William
Udall, Frederick A.
Walter, Leonard
Watts, Albert C.
Weeks, Rodney C.
Westwick, Frank W.
Wiseman, William J.
Wise, William H.
Wyver, Harry

GRADE I.

Second Class.

Ainge, Frederick C.
Appleyard, Norman
Ashwood, Roland S.
Bartlett, Thomas
Beddow, Clarence
Blethyn, Albert E.
Bone, Arthur
Burroughs, George
Cook, Charles
Crathorn, Ernest
Davies, James
Drinkwater, Herbert G.
Fitton, Leonard
Ford, Albert
Freeman, Norman W. H.
Garrud, Thomas V.
Gelleff, Arthur A.
Grimsby, William
Godbehear, Harry C.
Hargreaves, James
Hickson, Charles E.
Hobbs, Sidney
Hodgson, William
Holben, Arthur R.
Houghton, George E.
Hyde, John
Johnson, Jason H.
Johnston, William
Jones, Arthur
Jones, Arthur B.
Joyce, John G.
Kinder, Harold
Main, Arthur H.
Mechen, Arthur
Merchant, Ambrose C.
Millard, Fred. H.
Morsman, Alfred
Mosley, Cyril
Newcombe, Herbert G.
Parry, John E.
Pocock, Charles H.
Pogson, Harold
Prentice, Fred. W. L.
Pressman, Alfred E.
Roberts, Robert
Seed, George
Smith, Ernest T.
Steer, John F.
Stott, Harold
Taylor, Paul H.
Treby, George
Trobe, Norman
Tucker, Stanley A.
Vickers, Ernest
Walker, Harold S.
Wells, William E.
West, Ernest A.
Woodley, Charles A.
Yates, Charles

Exhibits at the Royal Show.

Apart from the large display by Messrs. Crossley Bros., Limited, to which reference was made in the "JOURNAL" last week, there was nothing of particular interest from the gas engineering standpoint in the exhibits at the Royal Show which concluded at Nottingham on Saturday. There were, however, many evidences forthcoming of the latest application of oil-engines for motive purposes in relation to agricultural appliances; and for one of these, an oil-engine, for double engine cable ploughing, the Society's silver medal was awarded to Messrs. Walsh and Clark, Limited, of Guiseley. Adaptable also as an agricultural traction engine, the motor is of the two-cycle type. One of the claims made in regard to the invention is that it is the only traction motor capable of being stopped under load and again set in motion without disconnecting the friction clutch. Messrs. Blackburn and Co., Limited, of Stamford, after exhaustive tests, secured another of the four silver medals given this year; their success being for notable improvements in an oil-engine. They had won similar recognition at the Park Royal Show in 1904, for a governor for oil appliances.

ELECTRICITY SUPPLY MEMORANDA.

THERE are mixed feelings in the electric supply industry to-day. There generally are; but they are more mixed than usual just now. July 1 saw the announcement by various electric-lamp firms that they were placing on the market domestic "half-watt" lamps, which we anticipate, when put under photometric test, will prove to have no more claim to a candle-per-half-watt efficiency than their larger unit predecessors. For ordinary pressures—200 to 255 volts—it seems that for domestic purposes the makers have not yet got lower than 200-candle power, which it is claimed can be obtained "for a consumption of 100 watts only." If precedent stands for anything, one or other of these figures is wrong (perhaps both). There are not many 100 to 130 volt circuits in this country, unless private generating plant is employed, or transformers are brought into play. Of course, the lamps can be used connected-up in series. But for such circuits, a lamp of 120-candle power for 100 to 120 voltages is said to be available, "taking but 60 watts." For pressures of 25 volts, there are lamps taking only 15 watts. In making this announcement, the "Electrical Times" says that larger units for 200 to 255 volts, taking 150, 200, and 300 watts respectively, and other sizes for 100 to 130 volts, have also been introduced. "Meteor" thinks this would be a sensational piece of news were it not for the existence of the war. The lamps (which are argon-filled) have their drawbacks. A unit of 200-candle power for the common voltages is not very likely to be a popular one; and if two of the (100 to 130 volts) 120-candle power lamps are installed in series, the position is worse. Anyway, the lamps for domestic use would have to be shaded-down by eye-protecting devices, and thus efficiency in relation to consumption would be depreciated from the point of view of useful light. In fact, our contemporary acknowledges that "the new lamps should be used with special lanterns when employed for outdoor lighting, to allow of adequate ventilation and protection from the weather; while for use in private residences, especially on high voltages, semi-indirect or indirect lighting fittings seem to be called for to eliminate glare." "Seem to be called for!" Our contemporary might safely be a bit more positive. The 200-volt 100-watt lamp is listed at no less than 12s. 6d.; and the size is 6¼ in. from the pip to the cap by 3⅜ in. diameter through the bulb. There is still hopefulness on the part of some electrical people that the lamp manufacturers will succeed in getting lower still in unit size; but the managers of electricity supply concerns in residential areas devoutly hope they will not, for bankruptcy or a considerable increase in the price per unit would have to be faced. For them, any further increase of efficiency will mean a complete upheaval of all the conditions on which their stations have been built and run, and business conducted.

Domestic "Half-Watts" on the Market.

There has been a slight reverse in the House of Commons Committee Rooms for the Northumberland clause in connection with the Southampton Corporation Electric Lighting Order, which proposed an extension of the supply area. It was the Committee presided over by Sir Edwin Cornwall (as our "Parliamentary Intelligence" last week showed) who rejected the application made by Mr. A. M. Paddon, on behalf of the Southampton Gas Company, for the insertion of the clause. Parliamentary warfare, in connection with matters of this kind, is always more or less vacillatory. It is not the first time that the Northumberland clause has been refused; but applications for the insertion of it, or of its successor (the Winchester clause), have been more frequently granted than rejected. The Southampton Corporation were keen against not having the clause put upon them; and they brought up Sir John Snell, the President of the Institution of Electrical Engineers, to support them. Why they took all this trouble is not explained. If they carry on their trading in a business-like way, there can be no possible reason why the presence of the Northumberland clause should interfere with them. But they excused their opposition to the insertion of the clause on the ground that, with the clause in existence, it would be impossible to enter into long-period contracts for power supplies at low rates. There is not the slightest reason why the clause should affect such contracts. It is not good business to enter, for a considerable period, into contracts in which all contingencies are not provided for either in the price itself or by some condition in the contract. Sir John Snell himself stated that, in a contract which had been entered into by the Corporation at such a low price that they asked to be excused from making disclosure of the terms even to the Committee (which to say the least looked strange), he should have preferred to see a coal clause inserted, so that the price could be readjusted to altered coal conditions. There is more reason than ever now why municipalities should be compelled to conduct their electricity business so that one class of supply is not a charge, or rather part charge, upon another class of supply. Coal, oil, and materials generally are all dearer than they used to be; and carriage, labour, rates and taxes, and other expenses are heavier—in fact, there has been a complete change towards sterner conditions. In view of this, there is all the more need for protecting ratepayers against commercial mismanagement. Sir John Snell used to think this. He thought so in 1911, when the Winchester clause was put upon the Winchester Corporation—partly due to Sir John's evidence. In his Presidential Address to the Institution of Electrical Engineers, he showed the absurdity of electrical engineers claiming to be able to supply at ½d. per unit—all expenses told. He informed the Southampton Corporation not long ago that, while the supply of electricity at ½d. per unit for heating and cooking was not doing harm to the undertaking just then, he advised the discontinuance of the practice, and instead the establishment of a fixed charge tariff, *plus* ½d. per unit. The recommendation speaks louder than all else. Now, Sir John comes along, and says his opinion has changed since 1911, when he gave evidence for the Gas Company in the Winchester case. Does this mean that in 1911, Sir John's consideration of the question had been of such an immature character that he helped them to do something which he ought not to have done? It seems that the attitude he now takes up is that, if the Northumberland or Winchester clause is enforced, further losses would be incurred by increasing prices. We do not follow Sir John in this. Business ought not to be conducted in such a manner that losses occur. But here we have the President of the Institution of Electrical Engineers setting up the theory that unbusiness-like and profit-losing methods, if readjusted on a sound financial basis, would make the position of a concern worse. At any rate, we understand that this is his contention; and we leave him with it. Sir John appeared in the Long Eaton preferential charge case, and supported the action of the Council in what they were then doing. The result of that case is well known.

Changed Opinions.

The Institution of Electrical Engineers is usually the butt of the critics of organized effort in the electrical industry. For some time past the enthusiasts of the industry have given up all hope of seeing the Institution taking part in any forward movement; and they have in consequence been looking to other bodies to take the initiative—for example, the Incorporated Municipal Electrical Association. But this body has not been very successful in the part it has essayed to take in the so-called forward movement. Illustrating this is the Bill the Association promoted in Parliament, and which it was thought would be the Magna Charta of the municipal electricity industry through the conferment of extended trading liberties. The measure has now got the dust of years upon it; and it has made no progress. The Association, too, took upon itself the task of canvassing for subscriptions for the maintenance of the defence to the action in which the Ilford Council were brought to book for adopting illegal trading procedure. After endeavouring to get money sustenance for the Council, the Association had the mortification of finding that they had been proposing to support something that had not behind it a shred of statutory justification. Now "An Engineering Correspondent" of "The Times" lashes about him in a most unmerciful manner, with a view, as he says, to stimulate a livelier spirit in the Association. He does not think the pace of members is fast enough; and, in fact, with the exception of a few, he is of opinion that the members have not the wherewithal within their natures to show any real go. Gems from this piece of character reading on the part of "An Engineering Correspondent" are worth giving. He asserts that the Association appears deficient in both commercial push and professional enthusiasm. While admitting that there are a few representatives of genuine and ardent business aptitude, he indicates that there are far too many others who are merely content to avoid mistakes, and to adopt only methods and machines that have been proved safe by long trial elsewhere. "They cannot be expected to reform their natures; but they can do much otherwise to accelerate general progress without personal risk. For example, they may refrain from purely dialectical or mathematical opposition to the enterprise of their more courageous professional brethren. It is always easy to describe mere difficulties, and to present reasons for not doing something which is in some degree speculative. But it is much more to the advantage of the electrical supply industry that those managing engineers who are eager to force the pace should be encouraged." It is clear from this that "An Engineering Correspondent" would like to see the members a bit more speculative, rather than pursuing development with prudence. Speculation has not proved itself a good friend to the electricity supply industry, as witness the pile of *débris* to be found in its historical record. It is clear, however, that there is little hope for stimulating the Association until a new generation of members comes along, seeing that the present ones "cannot be expected to reform their natures." It would be illogical to submit otherwise.

"Natures" of the Members of the I.M.E.A.

It will be remembered there was some talk last year as to the promotion of a Joint Bill by municipal authorities with the view to obtaining from Parliament the wiring, hiring, and fittings powers which the Incorporated Municipal Electrical Association have failed to secure for them through the Bill which has had such a weary wait in and about the Houses of Parliament. It seems from the report of the Council of the Association that the suggestion of a Private Joint Bill by local bodies for the purposes in view did not "take on." The observations by various authorities in reply to a circular-letter were not at all encouraging; and so action came to a dead-end. Reluctantly the Council returned to the old soiled-with-age Bill. But there is a proposal to freshen this up with a point which must

The I.M.E.A. Bill and Systems of Charging.

be narrowly watched—that is to say, a proposal to insert a clause authorizing special systems of charging based upon electrical assessment. It is not clear what the Council are after in this connection; but it would be well to look closely into the matter when, if ever, an amendment is made in the draft Bill. The Council, as is known, made themselves busy over the Ilford preferential charges and fittings case. It appears that the Association were asked to support the Borough Council. This the Association did, by taking the very questionable course of begging contributions to the costs that were being incurred by the Ilford Council. It is stated that "considerable financial support was promised in response." What a lot of numskulls they must have been who promised support to a case which had such a shocking ending—on every point, proved and admitted illegality. It is interesting to note that Mr. Faraday Proctor, the Electrical Engineer of Bristol, and Hon. Secretary of the Association, has examined the tariffs of over a hundred electricity undertakings, and is of opinion only a few could have been the subject of attack. We do not know what legal qualifications Mr. Proctor has for judging these things. Sir John Snell and the electrical engineers of Long Eaton and Ilford came a cropper over the matter. Why not Mr. Faraday Proctor? It appears that the doubtful tariffs are being amended, or amendment is under consideration. We repeat that it will be necessary to keep under observation (so as to see that it does not affect fundamental statutory principles) the question of introducing a clause in the Association's Bill authorizing new systems of charging.

Capital and Economy.

Most of the electrical papers now seem to have completed their description of the electrical equipment at the Regent Palace Hotel. Naturally they are all elated over it, most of them to the extent of several columns; but amid it all room has been found for two words which indicate that gas and coke have a large part in the work of the huge kitchens. "Electrical Industries" makes a point of the economic principle regarding "the soundness of spending capital freely to achieve economy and efficiency in working." Our contemporary ought to have qualified this, as the electrical industry supplies numerous instances of the unsoundness of spending capital freely, inasmuch as it has not always resulted in economy and efficiency, but has imposed an all too heavy burden on the undertaking, represented by deficiency of profit which in one case has to be met by the ratepayer, and in the other case does not contribute to the happiness of the shareholder. In other instances, free capital expenditure may be quite a lucrative investment; but our contemporary seems to think that spending money on electric-fires is an economy-promoting act. "Electric-fires," it says, in every one of the thousand and odd bedrooms in the Regent Palace Hotel, "seem a luxury until one reflects upon the saving in labour which results." What "seems" to be may be an actual fact. Saving in labour may be purchased too dearly by the outlay of capital. At the best, the installation of electric-fires is an expensive thing; and the maintenance charges of a thousand and odd such "fires" will be great. We saw last week that at Marylebone a rental equal to one-half the first cost is charged per annum for electric-fires. Then, with a very cold winter, occupants of the bedrooms, with *ad libitum* use of the electric-fires, will not trouble their heads as to how long or how often they use them. Assuming a thousand of the bedrooms occupied on a cold day, in one hour, with the fires going at full power, 1500 units of electricity would be metered through their use; and night and morning no care would be exercised by many of the migrant tenants as to the number of hours of use. Many people will use the fires who would not have a fire of any kind for which they had to specially pay. Considering all things, we are not satisfied that the electric-fire, with all its expenses—initial, maintenance, and running—is going to produce any monetary economy for the Regent Palace Hotel. At any rate, Messrs. Lyons and Co. have the means of making comparison, through the ownership of other hotels.

The Half-Watts and Photometrical Difficulties.

It appears that in the testing of gas-filled (or half-watt) electric-lamps, our photometrical friends at the National Physical Laboratory have found some fresh colour difficulty. In the recent annual report of the Laboratory, it is stated that the development of suitable sub-standards for use in the testing of the gas-filled electric lamps is becoming an urgent matter. Experimental standards have already been made up for the Laboratory by the Osram Lamp Works, and are being thoroughly tested before duplication into complete sets of standards. The cascade method adopted at the Laboratory for the realization of candle power in white light will be eminently suited for extension to these sources of light of still higher efficiency. Four sets of gas-filled standards are required to bridge the colour interval between the present highest temperature standards operating at 1·5 watts per candle, and those required in testing nitrogen-filled lamps. Their preparation and standardization are to be pushed forward during the year.

The Hon. Sir Edward Chandos Leigh, K.C.B., K.C., late Counsel to the Speaker of the House of Commons, who died in May, aged 82, left unsettled estate valued at £35,409 gross, with net personalty sworn at £35,087. Among the private bequests were £5000 to each of his sons—both killed in action.

A GAS COPPER-MELTING TEST.

The Furnace Exhibition at Newcastle-on-Tyne promoted by Messrs. John Wright and Co., of Birmingham, and the associated firm of the Brayshaw Furnaces and Tools Company, Limited, was visited by the Newcastle and District Association of Foremen Engineers and Mechanical Draughtsmen; and the members who accepted the invitation had not only an instructive evening, but also a very enjoyable one.

Among the various operations carried out was the re-heating of case-hardened samples of steel; and these were afterwards broken in a press to show the fractures. The strength of the core and the depth of the hardened portion were apparent. Another section of the company witnessed the hardening of ordinary carbon tool steel in the salt-bath furnace; while still others were interested in the heat treatment of high-speed steel. A number of carbon steel bars were hardened at a known measured temperature, and when fractured a beautifully silky texture equal to high-speed steel, and extremely tough to break, was the result. The bars were quenched in a patent fusible salt "Quenchite," at 140° C. This method of quenching gives unique results when treating taps and reamers; and it is said that thousands can be hardened without the risk of a single failure. The furnace used for the high-speed steel was of the twin-chambered variety. The upper chamber, used as a pre-heater, is heated by the waste heat from the lower chamber.

Those concerned with the heat treatment of high-speed steel will realize the importance of using specially-designed furnaces for the correct heating of this work, when it is pointed out that, after the particular samples used were placed in the heating chamber, the correct temperature was reached in less than thirty seconds. The samples were quenched out in a fusible salt "Feusalt," which is claimed to give great endurance, and eliminate risk of warping or breaking. This process also results in freedom from scaling and oxidizing, and enables high-speed steel cutters to be used for the most accurate work.

Perhaps the most interesting feature of the evening was an actual test in melting copper in an improved type of furnace which the manufacturers have recently introduced. Two scrutineers were appointed by the visitors to supervise and take the figures; and 61 lbs. 7 oz. of pure metal was placed in the crucible, and heated to pouring-point in 27 minutes, with a gas consumption of 130 cubic feet; this being at the rate of 2·11 cubic feet of gas per pound of copper dealt with. The members expressed surprise and great appreciation at the results achieved.

A vote of thanks to the promoters was proposed by the President (Mr. Norman M'Manus) and seconded by the Vice-President (Mr. Taylor), and suitably supported. It was pointed out by the visitors that they were pleased to see the close co-operation that there had evidently been between the gas engineer and the mechanical engineer in producing these particular designs of furnaces—designs which, in actual practice, had that day proved to them that gas-furnaces were no longer a hobby or a fad, but a sound commercial proposition.

The Late Mr. Gordon Walker.

Masonic readers will remember that an appeal was recently made to them to reserve their votes for the next election of the Royal Masonic Institution for Boys, on behalf of the two sons of the late Mr. Gordon Walker, of Wantage. We now learn that intimation has been sent to the friends who were interesting themselves in this case that both boys will be admitted to the Institution without election.

National Physical Laboratory.

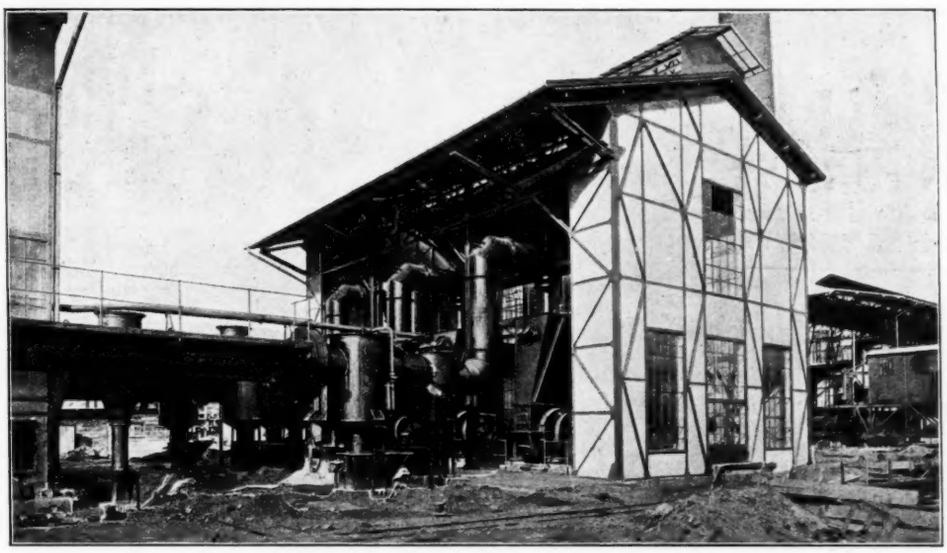
The annual meeting of the General Board of the National Physical Laboratory was held in the Royal Society Rooms last month, when the annual report and accounts for the year 1914-15 were adopted for presentation to the President and Council of the Royal Society, and the programme of work for the coming year was approved. Some extracts from the report were given in the "JOURNAL" for June 22, p. 692. This year the usual gathering of visitors at Teddington, to meet the members of the General Board and to inspect the Laboratory, will not take place, as 25 per cent. of the staff are away on active service.

Oil and Gas Prospecting in North America.—In the course of an article on "Prospecting for Oil and Gas in North America," Mr. Charles N. Gould draws attention to the importance of the assistance which can be rendered by the geologist in connection with such work. He contends that, though there are no absolute data for arriving at an accurate conclusion, the best estimates available would indicate that of the wells located without geological investigation not more than 5 per cent. are successful, while of those located by geologists as the result of careful work about 65 per cent. yield fine oil or gas. Not all of them, however, find these products in paying quantities, because there are certain things which neither the geologist nor any other man can tell from the surface.

THE NEW GAS-WORKS AT BUDAPEST.

By M. Isidor Bernauer, the Manager.

[Abstract-Translation of a Description in the "Journal für Gasbeleuchtung" for May 8, 15, 22, and 29.]



THE PRODUCER-GAS CLEANING PLANT AT BUDAPEST.

[For Other Illustrations of the Works, see "Journal" for Feb. 24, 1914, pp. 498 to 500.]

Historical.

A concession granted in 1855 by the Corporation of Pest to two Germans for the supply of gas to the town for a term of twenty-five years was transferred by them to the General Austro-Hungarian Gas Company, which was founded by certain financiers of Trieste and Vienna. One of the original concessionaires, Ludwig Stephani, of Mannheim, built the first gas-works, in the Józsefváros (now No. VIII.) district for the new Company, and distribution of gas began on Dec. 23, 1856.

The Company obtained concessions in 1866 from the town of Buda, and in 1871 from Obuda. In the former year they erected new gas-works in Buda, which served later also for the supply of Obuda. In 1872, a contract was made by the Company with the suburb of Ujpest, and a small gas-works was erected there. The three towns of Pest, Buda, and Obuda were amalgamated in the year 1873 to form the City of Budapest.

In order to meet the increasing gas consumption, new works were erected in 1884 in the Ferenczváros (IX.) district on the Pest side of the river; and in 1900 further works were built separated from this one only by a street. The five works enumerated served to supply Budapest with gas until the concessions of the General Austro-Hungarian Gas Company expired on Dec. 15, 1910. The gas consumption increased especially rapidly in the last three years of the Company's operations, reaching 2225 million cubic feet in the year 1910. At that time the output was equal to the maximum productive capacity of all the works—viz., very nearly 10 million cubic feet per diem. The Company naturally had not expended money on extensions in the years shortly before the expiration of their term of supply, and the plant was to a large extent rather antiquated and worked by manual labour. Moreover, owing to the growth of the city, the Józsefváros and the Buda works were by this time in the midst of closely-built districts, and the Ferenczváros works were on comparatively small sites of which extensions were almost out of the question, owing to their being bounded on all sides by streets. Consequently, when the Corporation took over the gas undertaking in 1910, the first question was the construction of new large gas-works.

The Corporation appointed Dr. Franz Heltai, who was subsequently Lord Mayor, General Manager of the gas-works, with the author (Isidor Bernauer) and Viktor Schön as technical collaborateurs. A detailed scheme for a new gas-works was drawn up by them; and this was submitted to a Committee of native and foreign experts who approved of all the more important proposals. In accordance with this scheme, the Corporation decided to abolish the Józsefváros and Buda works, and to erect new works, ultimately to have a productive capacity of 3530 million cubic feet per annum, on a site in the Obuda (III.) district. Provisionally, the works would be erected for a productive capacity of 8,825,000 cubic feet per diem. The preparation of plans and estimates for the construction of the new works was entrusted to M. Albert Weiss, the Manager of the Zürich Gas-Works, who had the assistance of MM. Bernauer and Schön. The plan and estimates prepared accordingly were submitted to a Technical Committee, who approved them; and they were then adopted by the City Council, who voted a credit of 40 million kronen (£1,667,000) for the construction of the new works and incidental work.

Temporary Measures.

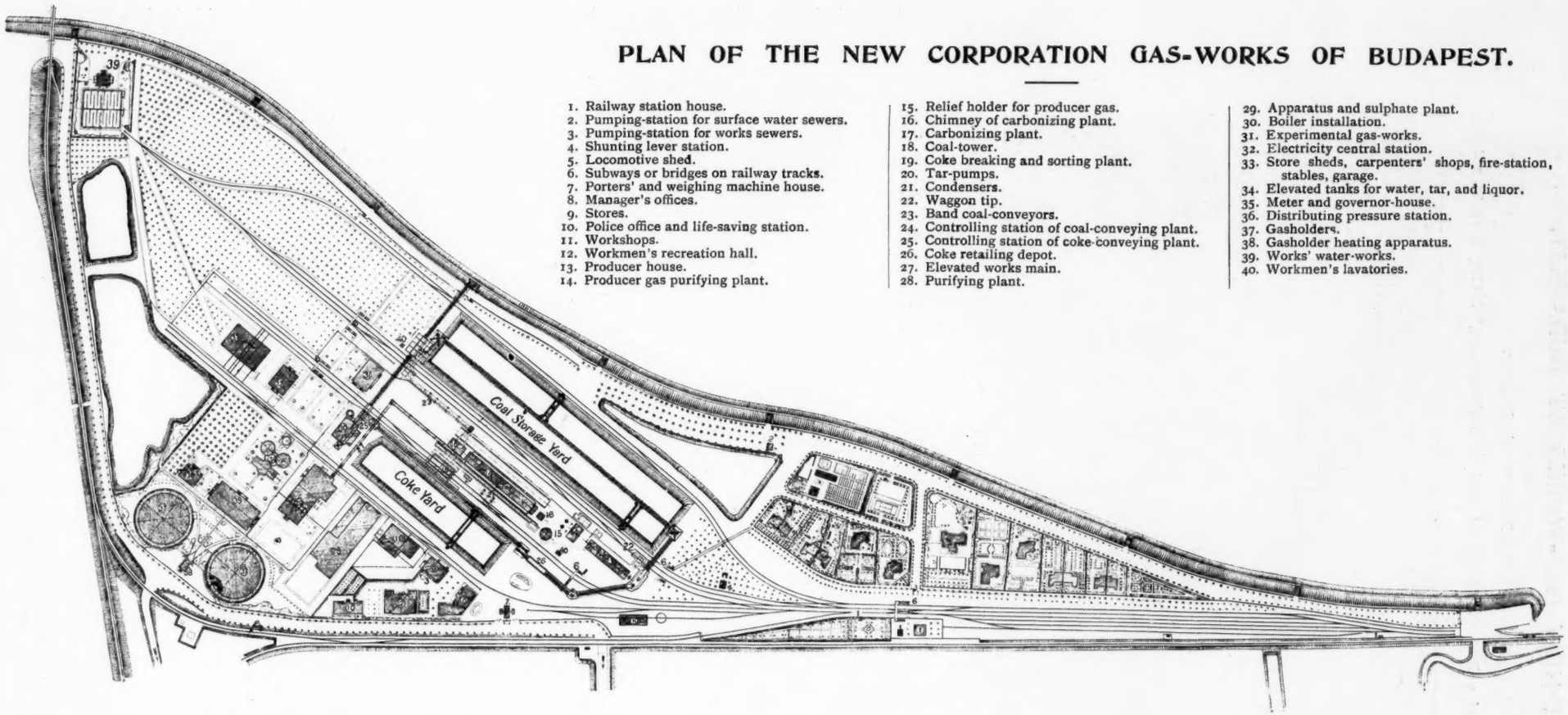
Having regard to the fact that the consumption at the time of taking over the old works had already reached their full productive capacity, it became necessary to take steps to increase the latter to meet the growth of consumption until the new works were ready. The steps taken included the erection of a new gasholder of 2,120,000 cubic feet capacity in the Lipótváros (V.) district on the Pest side of the river, with high-pressure mains leading to it, and a new 40-inch distributing main to convey gas from it to the town. A compressor of 106,000 cubic feet per hour capacity was installed for pumping gas from the Józsefváros works to this new holder. Notwithstanding that the Buda works were to be abolished, it was found necessary, as a temporary measure, to erect a new holder there of 635,000 cubic feet capacity and a distributing governor for a 24-inch main. When the works should cease to be used as a manufacturing station, this gasholder and governor would continue to be employed for distributing purposes.

At the first of the Ferenczváros works, new condensers, exhausters, washers, purifiers, station meter, and the necessary boilers and buildings, were provided for a capacity of 2,470,000 cubic feet per diem, which additional plant admitted of the existing retort installations being worked to their full capacity. At the second of the Ferenczváros works, it was decided, in order to increase their output and at the same time get information of value for their subsequent reconstruction, to instal two settings of Woodall-Duckham continuous retorts, having a productive capacity of 424,000 cubic feet per diem, together with all the necessary plant for the subsequent treatment of the gas made in them. Finally, in order to increase the area available for the storage and handling of coal and coke at the two works, a piece of land, separated from them merely by a street, was taken for use as a coke storage and screening yard.

These measures sufficed to enable the old works to meet the increasing demands for gas during the years 1911 to 1913. The consumption in 1913 was 32 per cent. more than in 1910. The distributing system, as taken over from the Company in December, 1910, had a length of about 374 miles, and a cubic capacity of about 470,000 cubic feet. But it was much obstructed by naphthalene deposits. There were no naphthalene washers in the old works, and high heats were adopted in order to force the output of the settings. The result was that when the City took over the gas supply, naphthalene obstructions gave rise to very numerous complaints from the consumers. The Corporation therefore started naphthalene extraction by washing, and laid many new large mains and cleared some of the old ones. By the end of 1913, the mains had been increased in length by 24·42 per cent., and in cubic content by 73·68 per cent., compared with the end of 1910. The expenditure on the mains in the three years was about £208,000.

It had been intended to utilize the two largest holders at the

PLAN OF THE NEW CORPORATION GAS-WORKS OF BUDAPEST.



1. Railway station house.
2. Pumping-station for surface water sewers.
3. Pumping-station for works sewers.
4. Shunting lever station.
5. Locomotive shed.
6. Subways or bridges on railway tracks.
7. Porters' and weighing machine house.
8. Manager's offices.
9. Stores.
10. Police office and life-saving station.
11. Workshops.
12. Workmen's recreation hall.
13. Producer house.
14. Producer gas purifying plant.
15. Relief holder for producer gas.
16. Chimney of carbonizing plant.
17. Carbonizing plant.
18. Coal-tower.
19. Coke breaking and sorting plant.
20. Tar-pumps.
21. Condensers.
22. Waggon tip.
23. Band coal-conveyors.
24. Controlling station of coal-conveying plant.
25. Controlling station of coke-conveying plant.
26. Coke retailing depot.
27. Elevated works main.
28. Purifying plant.
29. Apparatus and sulphate plant.
30. Boiler installation.
31. Experimental gas-works.
32. Electricity central station.
33. Store sheds, carpenters' shops, fire-station, stables, garage.
34. Elevated tanks for water, tar, and liquor.
35. Meter and governor-house.
36. Distributing pressure station.
37. Gasholders.
38. Gasholder heating apparatus.
39. Works' water-works.
40. Workmen's lavatories.

Józsefváros works as storage holders after these works had been done away with as a manufacturing station. On examination, however, they were found to be in bad condition; and it was decided therefore to build a new holder of 5,300,000 cubic feet capacity on a fresh site in the Köbányaváros (X.) district on the Pest side, to take the place of the old holders. This holder, the erection of which was begun in the spring of 1913 and finished last autumn, is supplied through a 32-inch main from the Obuda works, and is connected by a 48-inch distributing main with the district. A special credit of £167,000 was voted by the Corporation for the erection of this holder, including the cost of the site, mains, governor, &c.

The New Obuda Works.

The site of the new works is on the right bank of the Danube, adjoining the branch on which are the shipping wharves, and directly below the bridge of the railway from Pest to Esztergom. The place is known as Homokos-Ried, and is close to the ancient Roman colony of Aquincum. The site is a long triangle, bounded on the north by the embankment of the Esztergom railway, on the east by the Obuda and Császárfürdö junction line, and on the south-east by the branch of the Danube. It is thus cut off from neighbouring ground. The site was at one time part of the land which was flooded by the Danube. The subsoil consists of sand, loam, and Danube ballast. The underground water is not very copious, but its level is comparatively high—varying between 13 and 16 feet above the mean level or datum of the Danube. The ground level was nearly 27 feet above the mean level of the Danube at the suspension bridge in Budapest, or nearly 317 feet above sea level datum of the Adriatic Sea. The site had to be protected from floods by dykes 32 ft. 2 in. high; and the ground level was raised by tipping ballast, taken from the bed of the Danube, to an average depth of about 80 inches. Its area is about 9982 acres, which is ample for gas-works of about 35 million cubic feet per diem productive capacity. The construction of the dyke and the raising of the level of the ground were begun in October, 1910.

The arrangement of buildings and plant on the works naturally depended largely on the shape of the site and on the railway connection. The disposition adopted is shown in the annexed plan of the works (fig. 1). Since supplies of coal might be received either by rail or water, the coal-store and settings were arranged parallel to the Danube; and the apparatus and other works' buildings were at right angles to them. For handling the traffic, railway tracks have been provided, having a total length

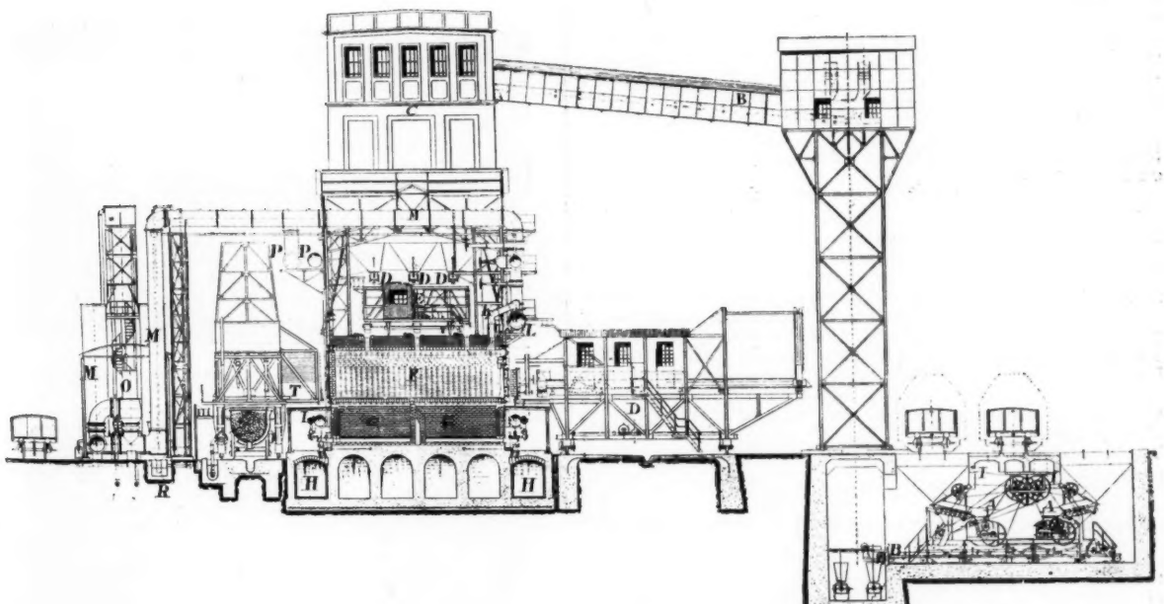
THE CHARGING STAGE OF THE PRODUCER HOUSE.

of about 6¼ miles. They are connected with the Angyalföld junction curve of the circular railway on the right bank of the river, and switches thus give direct communication with either the Angyalföld or the Obuda stations. There is a single track connecting line, which communicates with six tracks of sidings, each 550 yards long, and with nine tracks for traffic about the works. The incoming trains are taken over at the works' railway station, and from this point are handled by two shunting locomotives belonging to the works. Each of the sidings will accommodate thirty of the 20-ton waggons. There is a special platform for the passenger traffic.

The plant installed on the works for the time being is designed for a maximum productive capacity of 9,532,000 cubic feet per diem; but it has been so arranged that extensions can be carried out to raise the output to 35,300,000 cubic feet without causing any interruption of working. Ultimately there will be two coal-storage yards; but at present only the southerly one has been provided. This yard has a length of 1050 feet and a width of 230 feet, and is divided lengthwise into two halves by the large bridge of the conveying plant. It has a concrete floor, and when the coal is heaped to a height of 26 ft. 3 in., it will store nearly 120,000 tons. This would suffice for nearly three winter months' requirements for a maximum daily output of 17,500,000 cubic feet of gas.

Carbonizing Plant.

Alongside, and parallel with, the coal yard is the carbonizing plant, which consists of horizontal ovens or large chambers on the Koppers system. The choice of these ovens was largely influenced by observation of the installation of them at the Leopoldau works at Vienna. But certain changes were made as the result of the experience gained there. The Obuda installation comprises



A. Coal-breakers.
B. Band conveyors.
C. Bunker.
D. Shoots.
E. Charging waggon.
F. Carbonizing chambers.
G. Regenerative system.
H. Main flues.
I. Producer-gas main.
K. Coal-gas main.
L. Hydraulic main.
M. Foul-gas main.
N. Condenser.
O. Governor.
P. Works main.
R. Tar overflow.
S. Expelling machine.
T. Quenching tower.
U. Quenching waggon.

INSTALLATION OF CARBONIZING OVENS ON THE KOPPERS SYSTEM AT THE OBUDA GAS-WORKS AT BUDAPEST.

78 chambers, which are in four benches—two of nineteen chambers and two of twenty. Each chamber is 32 ft. 10 in. in length, 17¾ inches wide, and from the base to the top edge of the masonry 9 ft. 10 in. high. They are charged through three openings at top, and the charge is exactly 10 metric tons (9·84 English tons). The Koppers system of heating puts vertical heating passages between the chambers and the regenerative system underneath. One-half the chamber is heated at a time; the spent gases passing into the regenerative system of the other half. This order is reversed every half hour; the gases taking the opposite direction and the other half of the chamber being directly heated.

The chambers are charged with coal from a coal-tower erected at the northern end of the settings. This tower is in reinforced concrete, and holds 1200 tons of coal. A charging waggon runs on rails on the stage on top of the settings, and is driven by an electric motor. The charging waggon contains three bunkers, with funnel-shaped openings corresponding with the charging openings of the chamber ovens. For charging, the waggon is driven under the coal-tower, filled with coal by opening sliding valves, driven back to the chamber which has to be charged, and, on raising a lever, the charging funnels are opened and the coal is discharged into the chamber. The conical heaps of coal under each charging opening in the chamber are levelled by a device which is carried by a waggon that travels in front of the chambers. The doors of the chamber are then shut, and the charging operation is finished.

Coke Discharging and Handling.

The charge is left in the chamber for twenty-four hours, when carbonization is complete. The doors which close the ends of the chamber, and are lined with fire-brick and water-cooled, are then raised by cranes attached to the discharging machines which travel on rails in front of the benches. The machine on one side contains a strongly constructed ram or pusher-head by means of which the slab of coke is expelled from the chamber into the quenching waggon, which, with the quenching tower, is placed on the other side of the bench. The quenching waggon is a double-walled trough-shaped vessel, of wrought-iron plates, which travels on wheels in front of the bench. The lower half of the inner wall or lining of the waggon is perforated. The waggon is large enough readily to hold all the coke from one chamber.

As soon as the coke comes into it, quenching water is admitted from a reservoir on the tower into which it has been pumped, and at the same time water is sprayed from overhead sprinklers in the tower on to the top of the coke. In this way the discharged coke is rapidly and thoroughly quenched. The quenching water is then run off through two discharge cocks into an open trough extending the length of the bench and conveying the water to a settling tank at one end. The coke dust deposits in this tank, and the water is pumped again into the tank on the quenching tower for further use. The hood at the top of the quenching tower serves to carry the steam liberated in quenching to a high level, and prevent it causing any discomfort to the men. The whole of the machinery is operated by electric power.

After the coke has been thoroughly quenched, the quenching waggon is driven to the upper end of the bench, where it is turned on its longer axis and so caused to discharge the coke into a pit above the coke-breakers. The broken coke is then raised by two bucket elevators to a tower which contains sorting screens placed over a coke-bunker. The screens consist of horizontal perforated plates to which rotary movement is given. The coke is sorted into four sizes—large, over 1⅝ inches; nuts, 1 inch to 1⅝ inches; small, ⅜ to 1 inch; and grain and dust, less than ⅜ inch. The sorted coke is delivered into separate compartments of the bunker; and from these it can be discharged either into railway waggons passing underneath, or into telpher cars, by which it is conveyed to the coke-storage yard, to the retailing depôt, or to the quay on the Danube.

Retort-Heating System.

In regard to the carbonizing plant, it should be observed that each of the heating walls between two adjacent chambers has a separate regenerative system; so that any one chamber may be brought into action or let down, and the heat of each chamber regulated independently without interfering with the working of adjoining chambers. The carbonizing chambers are heated by producer gas from a central installation of twelve revolving grate Kerpeley producers. Ten of these producers gasify Hungarian brown coal or lignite, and the remaining two are high-pressure producers for the gasification of coke-breeze. A report on the working and efficiency trials of the producer installation has already been given in the "Journal" [see Vol. CXXX., p. 26]. The general arrangement of the whole of the carbonizing plant is shown on p. 23.

(To be continued.)

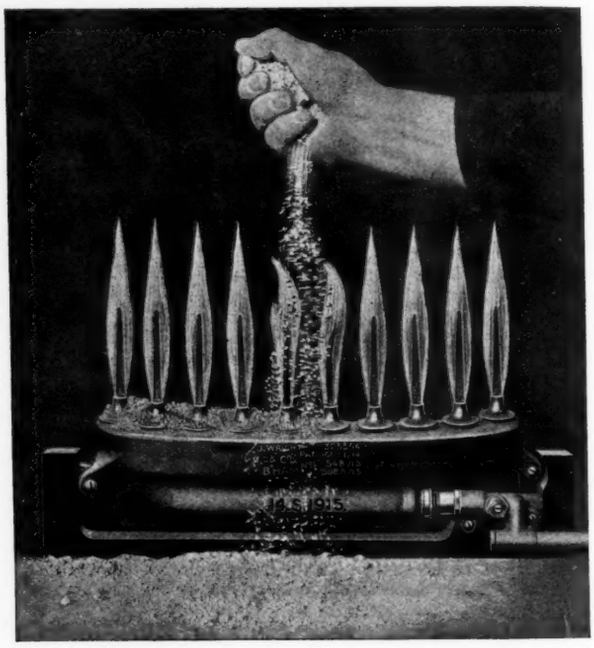
Heating Studentships.—Two Heating Studentships, tenable in the Faculty of Engineering of University College, London, each of the value of £50 a year, together with £11 11s., being the amount of college fees, may shortly be awarded by the Institution of Heating and Ventilating Engineers. Candidates must produce evidence that they have already pursued a course of engineering training, and are familiar with the work of an engineering laboratory. The research students will be required to devote their whole time to research work in connection with heating and ventilating engineering.

THE "INJECTOR-VENTILATING" GAS-GRATE.

Work for Next Heating Season.

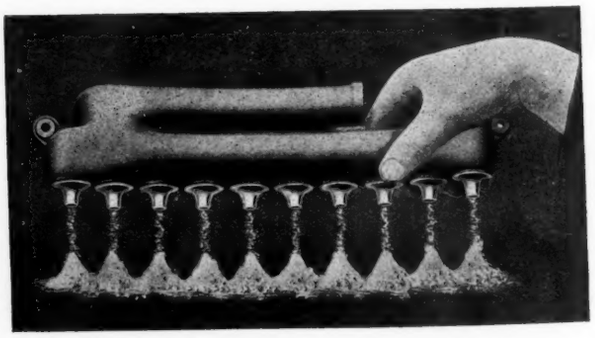
In our editorial columns to-day attention is drawn to the importance of managers of gas undertakings making an especially early move this year to get householders to place their orders for gas-fires for next winter, in view of the difficulties that will then be experienced in connection with the reduced force of available gas-fitters. Attention was called to this matter by Mr. H. James Yates in sending us a booklet explaining the principles and the merits of Messrs. John Wright and Co.'s new "Injector-Ventilating" gas-fire. The booklet opens with the "confident anticipation" that "within a very few years, gas-fires (already in widespread use) will have become as general a 'household word' as coal-grates themselves." There is a strong, but proper, optimism about this passage.

In an article in the "Journal" for Oct. 13 last (p. 75), the



Pouring-in an Excessive Quantity of Grit.

It will be seen that the moment the hand has passed on to the next teat, the flames become exactly as before.



Emptying-out the Grit—Showing the Large Quantity Put in.

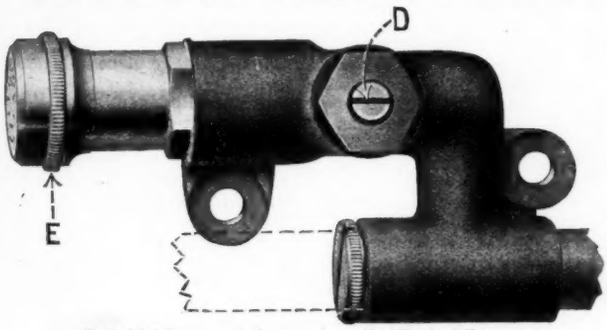
Sectional View.

In actual test, even when the thimble was filled with grit up to the point shown, the full quantity of gas continued to pass, and the flame-quality was unimpaired.

Exterior View.

new "Injector-Ventilating Thermo X Gas-Grates" were introduced to our readers. Prior to that, there had been an opportunity of witnessing a number of experiments with fires in which were embodied the new principle; and the results of the experiments supplied us with ground for saying that the construction and effects would, in our opinion, favourably appeal to a public which was being—gradually perhaps, but surely—educated up to the fact that the provision of warmth and the provision of ventilation are two things which should go together at the season of the year when most householders (rightly or wrongly is not the point) consider it necessary to close both doors and windows in order to keep out the external cold or damp atmosphere. Hitherto, upon the coal fire and the soot-coated chimney, there has been a large dependence in the matter of ventilation. Now Messrs. John Wright and Co. submit that their "Injector-Ventilating" gas-grate, with the patent thimble noiseless burner (which is a development of the "Thermo X" fires), is better in the matter of ventilation than coal-fires, because it avoids draughts, while further enhancing virtues are "the radiation is perfect, the burner is absolutely silent under all conditions, without depositing carbon on the radiants." Thus, it is contended that, with such fires, there is nothing to hinder the realization of the long-sought ideal—a gas-fire in every room of every house.

The "Injector-Ventilating" fire has been thoroughly tested since we first described it; and the public experience of last season—including that of engineers, architects, doctors, &c.—has, we learn, fully confirmed the experience and expectations of the firm. In consequence of this, the system has been applied to all the fires produced by Messrs. John Wright and Co., save in the case of the 8-inch fires and all types of dog grate. They have taken this step, because they are persuaded that the invention removes the last barrier to the universal adoption of gas-fires. Those readers who were interested in our original article on the subject—and who of them were not?—will remember that the system provides two openings (instead of one) to the chimney in the upper part of the fire, the lower of which openings carries off the products of combustion, while the upper one carries off a large volume of ventilating air—use being made of the current of combustion products through the lower outlet to promote, by injector action, the ventilating function of the upper outlet. By this means, a ventilating agency is provided which, while it does away with the need for a flue-pipe to the chimney, is as effective as a coal fire, and changes the air of the room several times an hour—in some cases up to as many as six times.



D. Initial Pressure Adjustment. E. Nipple Adjustment.

1915 Pattern Burner Injector Fitting.

(Full Size.)

A feature of the system which is introduced this year, in connection with the "Injector-Ventilating" fires, is the ventilation regulator which is fixed in the upper or ventilating flue.

Regarding the noiseless burning of gas-fires, which is an essential to-day, especially in the case of fires in bedrooms, or rooms in which sick or wounded are being tended, the firm call particular attention to their 1915 pattern burner injector fitting, of which we give a full size illustration. In such a fitting, adjustment means are requisite to deal with initial pressure, calorific value, &c. Such an adjustment, it is stated, permits of the regulation of the aëration of the gas to the degree necessary to equally heat the entire radiant, without causing deposition of carbon. The fitting therefore embodies a distinct initial pressure adjustment so as to ensure silence at the nipple orifice (this being a perfected adaptation from last year), and a second adjustment on the fitting is for regulating the amount of gas issuing from the nipple to suit the calorific value, &c., of the gas. The two adjustments, however, would alone be only partially effective without provision for thoroughly mixing the gas and air. An increased degree of aëration is now rendered possible, without the risk of flame noise, by, the firm claim, their patent perforated thimble, which is fitted inside the teat of each burner. The perforated surface of the thimble, being vertical, does not get choked by grit from the chimney, or by dust and fluff from the atmosphere. Experiments have shown that, when a larger quantity of grit is placed on the thimble than would fall into it in actual use, the extended depth of perforated surface still permits the passage of ample gas for a perfect flame. The advantages of the patent "Thimble" noiseless burner are summed up as follows: Perfect in combustion; adjustable for all ordinary distribution pressures, calorific power, &c.; noiseless; non-luminous under all conditions; dirt-proof.

PHOTOMETRIC DEFINITIONS, STANDARDS, AND METHODS.

Some American Proposals.

The June issue of the "Transactions of the American Illuminating Engineering Society" contains the text of a paper presented at a meeting of the Philadelphia Section held on May 21, by Mr. HERBERT E. IVES, who remarked that a series of studies in photometry—more particularly in connection with lights of different colour—had led him to suggest the adoption of a new standard of luminous flux and of a definite photometric method in heterochromatic photometry. The steps leading to these suggestions, and the arguments in favour of their adoption, were given in papers listed in a "Bibliography" at the end of his communication. What was presented for publication in the "Transactions" of the Society was a specific set of suggestions in tabular form, to be taken up later for consideration, if desired, by the appropriate Committee of the Society.

DEFINITIONS.

Power Consumed by a Light Source = P; expressed in watts, a portion of which is dissipated by radiation, the remainder by conduction and convection.

Power Radiated by a Source = $R = \int_0^\infty R_\lambda \, d\lambda$ = power emitted by a light source in the form of radiation between wave-lengths o and ∞, expressed in watts.

Radiation Efficiency = $\frac{P}{R}$ = ratio of the power dissipated as radiation to the total amouut of power consumed by the source. (A pure numeric.)

Luminous Flux = F = radiant power evaluated according to its capacity to produce the sensation of light.

Light Evaluating Factor or Stimulus Coefficient of any radiation is the ratio of the luminous flux, in its appropriate units, to the radiant power producing it, in its appropriate units.

The Luminous Efficiency of any Radiation = L_R = the relative capacity of the radiation to produce the sensation of light, compared with the capacity of the same quantity of radiation of the maximum possible light producing capacity. (A pure numeric.)

> The luminous efficiency of any radiation is the mean value of the luminous efficiencies of its component mono-chromatic spectral radiations. These latter are specified by the luminosity curve of the normal equal energy spectrum, of maximum value unity. The spectral luminosity curve is obtained by the standard photometric method for coloured light photometry.
>
> To a close approximation the spectral luminosity curve is represented by the expression:

$$L_\lambda = A\left(\frac{R_1}{\lambda} e^{1-\frac{R_1}{\lambda}}\right)^\alpha + B\left(\frac{R_2}{\lambda} e^{1-\frac{R_2}{\lambda}}\right)^\beta + C\left(\frac{R_3}{\lambda} e^{1-\frac{R_3}{\lambda}}\right)^\gamma$$

where

A = 0·999	R_1 = 0·556	α = 200
B = 0·04	R_2 = 0·465	β = 400
C = 0·095	R_3 = 0·610	γ = 1000

Total Luminous Efficiency of a Light Source = L_T = the relative capacity of the power applied to a light source to produce the sensation of light, compared with the capacity of the same quantity of power in the form of radiation of maximum possible luminous efficiency. (A pure numeric.)

Units.—Luminous flux is connected to radiant power by a numerical evaluating factor. The unit of power is the watt. The present arbitrary practical unit of luminous flux is the lumen. The light evaluating factor or stimulus coefficient is consequently expressed in lumens per watt. If for this evaluating factor is taken the luminous efficiency as above defined, the unit of luminous flux is the same as that of radiant power or applied power—namely, the watt.

In the symbols proposed:

$$P \times \frac{R}{P} \times L_R = P \times L_T = F.$$

In order to go over to the watt as the unit of luminous flux it is necessary to know the:

Mechanical Equivalent of Light = the value of the lumen in watts of luminous flux.

[The lumen is approximately o·00162 watt of luminous flux, or light watts. The terms "specific consumption," "specific output," &c., involving relationships between watts and lumens, are superseded by the method of defining luminous efficiency, and by the adoption of the watt as the unit of luminous flux.]

The quantities derived from luminous flux—*e.g.*, illumination, luminous intensity, and brightness—are to be defined as at present, with the necessary substitution of the watt of luminous flux for the lumen wherever occurring. It is suggested that the new

unit of luminous intensity on the watt basis might be called the "pyr."

METHODS OF MEASURING LIGHTS OF DIFFERENT COLOUR.

Visual Method.—The visual method is specified by the type of photometric instrument, the conditions of its use, and the choice of observers.

The instrument shall be the "flicker" photometer, in which the photometric field shall be two degrees in diameter, with a surrounding field of as large diameter as feasible, of approximately the same brightness. The photometric field shall be maintained at an approximately constant brightness of 0·013 watt of luminous flux per square metre per unit solid angle (the brightness of a white mat surface under an illumination of 25 metre-candles, present practical units).

Precision measurements should be made by a group of at least fifty observers who possess no marked abnormalities of vision, or by a group of not less than five whose average readings are the same as those of the larger group.

[A group of five or more may be considered as constituting a normal eye group when their average value on the following colour difference is equality. Colour A: 72 grammes potassium dichromate + water to 1 litre. Colour B: 53 grammes cupric sulphate + water to 1 litre. These solutions at 20° C. to be contained in matched clear white glass tanks, 1 centimetre in thickness, and measured by the instrument and conditions above, over a standard 4-watt carbon lamp.]

Physical Method.—The characteristics of the average eye may be incorporated in a physical artificial eye, consisting of a radiometer whose spectral wave-length sensibility curve is that of the average eye.

A close approximation to such an artificial eye is furnished by a non-selective radiometer, over which is placed the following solution, in a thickness of 1 centimetre:

Cupric chloride	60·0 grammes
Cobalt ammonium sulphate	14·5 "
Potassium chromate	1·9 "
Nitric acid (1·05 gr.)	18·0 cc.
Water to	1 litre

This solution should be protected from overheating by the interposition of a layer of clear water at least 2 cm. thick.

SUGGESTIONS FOR RECOMMENDATIONS TO BE MADE BY THE SOCIETY.

The establishment of the watt as the unit of luminous flux, and the development of the precision physical photometer, depend upon the exact determination of the spectral luminosity curve of the average eye. The luminosity curve and the ratio of the lumen to the watt have been determined with considerable accuracy; but to meet the needs of the future, they should be even more definitely fixed.

It is suggested that determinations of these factors would be most appropriately made by the Bureau of Standards, and that, therefore, the Illuminating Engineering Society recommend to the Bureau as specific problems of value to the science of light measurement:

1. A determination of the average spectral luminosity curve by measurements upon at least fifty individuals, by the photometric method above specified.

2. A determination, using the results of the luminosity curve study, of the ratio of the lumen to the watt of luminous flux.

TRENCH OPENINGS AND REINSTATEMENTS.

As has been previously mentioned in our columns, the subject of whether gas and water companies should undertake the complete reinstatement of their trenches, or whether this should be transferred to the road authority, and upon what terms, is receiving increased attention at the hands of municipalities; and a paper at the annual meeting of the Institution of Municipal and County Engineers, last Friday week, dealt with the matter in some detail. The author, Mr. REGINALD BROWN, the Surveyor and Engineer to the Southall-Norwood Urban District Council, in the course of the paper recited the general inconvenience which is experienced by road authorities by statutory undertakings having powers to open the roads, and made certain suggestions as to dealing with the difficulties. We give the suggestions below.

From an administrative point of view, it would probably be best that no one except the local authority should break up the highways. But this idea is unworkable in general practice; and the author is satisfied that with statutory companies such an arrangement is not at all necessary. Let surveyors put forward some plan whereby the difficulties arising from trench openings can be obviated or minimized, then the author feels certain that they would meet with due consideration from the parties intimately concerned. First, as to the present methods.

(1) A company may open, fill in, and maintain for a period of six months.

(2) A company may open and fill in, and the local authority may maintain by arrangement with the company.

In both cases "notice to open" is given, and the surveyor may or may not supervise according to the extent of his district and other duties which prevent him doing so. If the supervision is not given during the opening and filling in, then satisfactory maintenance becomes more or less difficult according to the care and skill of the company's workmen. In urban districts, it might be comparatively easy for efficient supervision to be exercised; but in rural districts such supervision would be out of the question—even in some urban districts it would require the constant service of a special officer. Probably a simple arrangement would be for those who open the roads to pay the road authority for the cost of supervision—as in the case of tramway companies; and if this were done, the companies might be relieved from maintenance. The supervision could be exercised by an intelligent working man used to road construction; so that it would not be a costly procedure. Again, some agreed-upon details as to how such opening and filling in should be carried out would be much more satisfactory both to surveyors and companies concerned; and this will depend somewhat upon the nature of the road and the character of the traffic on same. The author then suggests the following for consideration.

Before any person opens a road, he should not only be required to give the statutory notice, but at the same time should deposit a plan showing the exact position of the trench, with dimensions, and the date on which the work is to be commenced and will be completed, and also stating the purpose for which the opening is needed. These notices should be entered up in a record book for easy reference at any time, and the date noted on which the maintenance terminates, so that if any repairs are necessary within that period the companies can be notified. The latter would be unnecessary if the companies were relieved of the maintenance as previously suggested. All openings to be excavated of the minimum width required for the particular purpose and, if necessary, the sides timbered. All subsoil material to be kept separate from the surface material.

The "filling in" is most important, as upon this depends the future maintenance. One often sees the sides of a trench badly filled in breaking away from the adjoining crust. The object to be aimed at is to get the earth back again into the trench in as nearly as possible the same space as it occupied before disturbance; and the nearer this can be done the better. The only way to do this is to thoroughly "pun" it in thin layers. The method of punning at the present day is not, however, satisfactory, and it depends upon the human equation. Two men with exactly the same weight of rammer will give very different results. It is therefore advisable for companies to be provided with mechanical rammers, and even then for the ramming to take place in layers not exceeding 6 inches in thickness.

The method of filling in near the surface will depend upon the nature of the road covering. Thus in a flint or macadam road there should be a layer of broken hard core, from 4 inches to 9 inches in thickness, solidly punned, and the surface coating applied at least 3 inches thick. This surface coating should not simply be applied within the limits of the trench itself, but should extend over the sides, so as to become incorporated with the adjoining surface which has previously been loosened; the whole afterwards being rolled. In paved roads a little different procedure might be thought necessary; but the author does not think so, if the consolidation is carried out in the manner suggested. The concrete bed and paving could be replaced immediately, but the same precautions should be taken as to carrying both beyond the limits of the trench itself. The author therefore suggests:

(1) Road authorities to supervise all openings; companies to pay cost of supervision and be relieved of maintenance.

(2) Filling in to be carried out by "mechanical" rammers—at proper pressure—in layers of not more than 6 inches.

(3) Surface material to be replaced immediately on a suitable foundation, according to the nature of the roads—both to extend beyond the limits of the trench and be incorporated with the materials of adjoining surface.

DISCUSSION.

Mr. BROWN, in introducing the paper, said that his idea was to have mechanical rammers worked by compressed air; there being different shaped rammers for the different type of trench.

Mr. J. W. HORTON (County Surveyor, Derbyshire) referred to the suggestion that, with proper inspection of trenches while they were being refilled, the statutory time for repairs might be relaxed, or indeed abolished. His experience, however, was directly contrary to this. Anyone with experience of the difficulties of restoring sewerage, water, or gas trenches would know that the period of six months laid down by Statute was insufficient; and the municipalities could not afford to do away with, or weaken it, in any way. He knew instances in which first-class contractors, anxious to do the very best work, had been unable to restore trenches in such a way that they could necessarily be relied upon at the end of six months to be as good as the original road. Quite recently the case of a gas-trench came under his notice, not a very deep one, which was still subsiding at the end of twelve months. This was the experience of practically every municipal engineer. No amount of inspection at the time of the reinstatement would give the result required. Further, it was not equitable that the highway authority should incur expense in order to increase the profits of any company, because this would be the effect of the suggestion to relax in any way the control that was given by Parliament. Therefore, he strongly opposed the suggestion that, by mere inspection at the time the trenches were filled in, satisfactory results could be obtained.

Mr. G. W. LACEY (Borough Surveyor, Oswestry) said that this was a very difficult subject, and he agreed that it was impossible to get the majority of trenches restored to their original condition

in the space of six months. An instance of a trench opening for gas-mains had come under his notice. In spite of its having been rolled three or four times, at the end of two years subsidences were still taking place.

Mr. H. G. Whyatt (Borough Surveyor, Grimsby) said he was at present preparing a report for a sub-committee on the question of the reinstatement of trenches. He did not agree with the author that the statutory period for which gas and water companies were liable to maintain their trenches was six months. From both the Gas-Works Clauses Act and the Water-Works Clauses Act, the company had to reinstate and maintain their trenches for twelve months; and he could not understand why Mr. Brown should have said six months, nor why the previous speakers in the discussion should have accepted this period. Perhaps it was because the Post Office only maintained its trenches for six months that this figure had been quoted. Even twelve months was not sufficient, because he knew of cases where, though the surfaces of the trench appeared to be quite satisfactory at the end of twelve months, at the end of sixteen months some form of crystallization, if he might use the word, had taken place, and subsidence had followed. A difficulty also was where the gas or water company carried out the reinstatement themselves, through a sub-contractor, of a tar-paved footpath. It would be found that the tar paving was put down of such a thickness that it only just lasted the statutory period. The difficulty of the whole question seemed to be that the local authority had no option with regard to maintenance; but at the same time they could make it very awkward for the company by insisting upon a plan and specification being deposited three days in advance of the opening. In Grimsby, however, the Gas and Water Companies agreed with him to reinstate the roadway; but they preferred to do the footpaths themselves, in order to save the trouble of a plan and the three days waste of time due to the necessary notice. Another matter of conflict was as to the charges to be made. If a schedule of prices was based upon small openings, it was far too costly for large openings; while if the schedule was based on the cost of large openings, the corporation lost money on the small openings. In the report which he was now preparing, he suggested that there should be three scales of prices—small, medium, and large trenches. The author had given no indication, except a brief mention, of the sort of mechanical rammer that he would employ and which would suit all depths and widths of trenches. Did he propose to have three or four of these on each job?

Mr. H. F. Gullan (City Engineer, Belfast) said he was quite convinced that it is impossible to restore trenches of any kind, and have no permanent settlement, by mechanical means. It might be possible to do it with a gravel subsoil, but with stiff clay it was impossible. In Belfast at the present time the gas, water, and electric light departments were all municipal; and the respective committees had agreed that the Works Committee should make the final restoration. The actual cost only of the work was charged; and the service had to be maintained by the various committees for twelve months. This insured a good, sound job, and every care was taken that the three departments mentioned were not overcharged for the work.

Alderman Hitchcock (Taunton) said he had endeavoured to come to agreements with the companies concerned in his town for reinstatement of trenches, but had had great difficulty with the gas people. He had tried his level-best with the Manager and the Chairman; but his efforts had fallen through. He would be glad to see an Act of Parliament by which municipalities could reinstate trenches themselves. In order to obtain a satisfactory result, it was essential that every shovelful should be rammed as it was put in; and if the material was wet, but not too wet, and good men were employed, a very satisfactory result could be obtained. The terms upon which he had endeavoured to agree with the Gas Company in Taunton were that they should be charged the actual cost of labour and nothing more. This, he contended, would be cheaper for the Company; but the Manager would not agree.

Mr. W. Harpur (City Engineer, Cardiff) contended that, once a road was opened, it was impossible to restore it to its original condition. Weather conditions had also a great deal to do with obtaining a satisfactory result. There were instances in his city where trenches had been restored as carefully as it was possible, yet after two years the mark of the trench was visible, and there were depressions and undulations all along it.

Mr. J. W. Cockrell (Great Yarmouth) wondered whether there were local meetings of gas, water, and electricity managers to arrange who should be the next to break up a road directly the surveyor had got it into a good condition. In dealing with the Post Office in Great Yarmouth, they originally arranged to charge the actual cost of the work, *plus* 7½ per cent. for supervision and office expenses; but this had been modified so that the 7½ per cent. was not charged.

Mr. Brown, in the course of a brief reply, asked if it were not possible for the Council of the Institution to take the matter up, and make suggestions in order to arrive at some definite specification which would be followed by the companies and authorities concerned in this matter. As to the period of six or twelve months, he did not think it mattered which. The real point was whether it would be possible to so repair the trenches as to relieve the companies entirely of maintenance. He did not regard the present system of forcing companies to maintain trenches for a certain period, after which the results were often not satisfactory to the road authority, as a proper one.

PIPING HOUSES FOR GAS LIGHTING.

At the March meeting of the Philadelphia Section of the American Illuminating Engineering Society a paper was read by Mr. H. R. Sterrett, in which he emphasized the importance of having a specification which will cover the installation of all interior gas piping. The method of handling this phase of the distribution system in one city is described; and the desirability of illuminating engineers deciding on the location of outlets was also discussed. The text of the paper appeared in the "Transactions" of the Society for June.

The author said that, although the Illuminating Engineering Society has primarily to do with the utilization of energy in the form of light, the design of burners and reflectors, the study of the effect of light upon the human eye, the determining of the quality and proper amount of illumination for the great number and variety of conditions under which artificial light is necessarily used, it was the object of his paper to tell something of the means used to convey "that form of light energy commonly known as illuminating gas" to the various outlets or points where it is to be converted by combustion into light or heat.

Broadly speaking, he said, any distribution system may be divided into four component parts—mains, services, meters, and house piping—each of which contributes equally to the satisfactory supply of gas. Of these divisions the first three are under the gas company's control, and hence "are usually properly installed and maintained." He follows with a brief description of a typical low-pressure distribution system.

He proceeds: The importance of a specification which will thoroughly cover the installation of all interior gas piping cannot be too greatly emphasized. In order that such a specification be of any real value, it is very necessary that proper laws be enacted to insure to the gas company the enforcement of the various rules embodied in the specification.

In one large city, before any gas piping may be installed in a building, it is necessary to obtain a permit from the bureau of buildings, which also inspects the work when completed and issues an approval card before a meter may be set; in another city, all piping must be installed in accordance with specifications issued by the gas company, whose inspectors supervise the work; while in still another city all gas-fitters must be licensed and file a plan of the proposed piping with the building department for its approval—the gas company supervising the installation.

In one city where about 375,000 meters are in use, the city government by ordinance requires the gas company to exercise a supervision over the character of material used, and work done, in installing gas piping and fixtures. In accordance with the obligation thus created, the company have adopted a specification for fuel and illuminating piping and fixtures, which includes the kind of material, methods, locations, &c., to be used and avoided in making installations, a schedule of pipe sizes and lengths for various consumptions, instruction how properly to draft a piping plan, and an explanation of just what is required in the way of inspections by the gas company's representatives.

The piping schedule is based on Dr. Pole's well-known formula for the flow of gas through pipes,

$$Q = C \sqrt{\frac{d^5(P_1 - P_2)}{LW}},$$

where Q = cubic feet per hour; d = diameter of pipe in inches P_1 = initial pressure, inches water; P_2 = terminal pressure, inches water; L = length in yards; W = specific gravity of gas (air = 1); C = constant.

A computer designed by William Cox is based on this formula, and saves much time which otherwise would be spent in making calculations. With the computer, the discharge, the required size of pipe, or the difference in pressure can be determined—provided the other two are known.

If the sizes specified in the schedule are checked with the formula, they will be found somewhat in excess of the figures derived from the latter; it being the desire of the gas company to make provision for the future installation of additional appliances without necessitating an increase in the size of piping. The smallest diameter pipe, and therefore the smallest outlet permitted, is ⅜ inch (9·52 mm.); and this, it is assumed, will usually supply 10 cubic feet (0·28 c.m.) per hour at the average pressure. The capacity of a larger outlet, as compared with a ⅜-inch outlet, varies directly as the areas.

In designing a system of piping, after the sizes of the various outlets and the best direction to run the pipes have been determined, it remains to decide the proper size piping to instal. This is accomplished by starting at the part of the system farthest from the meter and working toward the latter—determining the proper sizes by consulting the piping schedule. When the first branch line is reached, the sizes are again determined by starting at the far end of the branch and proceeding to the junction, where the quantities of gas for the two pipes are added and the same process repeated, until finally the meter is reached.

When no outlets are open, the pressure in a system of house piping is uniform, except the small difference due to elevation—each 10 feet (2·54 m.) being equal to about 0·1 inch (2·5 mm.) water column. Just as soon as a burner is lighted, gas begins to flow through the piping; and, as a result of frictional losses, the

pressure by the time the gas reaches the burner is reduced. Since it is necessary to have a certain volume of gas at a burner, and since the volume depends on the pressure as well as on the size of piping, a certain pressure loss through a system of piping must be used as a basis, so that in the piping schedule before mentioned a loss of 2-10ths water pressure between the meter and the farthest outlet is considered as maximum. Then, since there is from 25-10ths to 35-10ths (63·5 to 90 mm.) pressure on the mains and services, the pressure at an appliance connected to the extreme outlet would be from 20-10ths to 30-10ths—there being about a 3-10ths drop through the meter.

Due to the fact that there is a certain unavoidable range in pressure over an area as great as that included by the limits of a large city, gas appliances are usually equipped with the necessary means of adjusting the burner to take care of the different pressures.

In one large city, where the gas company is responsible to the city government for all material and workmanship in the installation of house piping, three inspections of interior piping are made—the inspectors being employees of the gas company, impartial, and working for the combined interest of the consumer and the company. When an installation is ready for the first inspection, which is made while the piping is still exposed, a plan of the system or extension, plotted on a regular form, is forwarded to the gas company. The inspector compares the actual installation with the plan, and tests the piping for leaks—a pressure of 3 lbs. (1·36 kg.) per square inch (6·45 sq. cm.), as indicated by a 6-inch (15·24 cm.) mercury column, being applied for ten minutes. If the rules have been complied with, and the system is tight, a certificate of first inspection is issued, and the piping may be covered. If any changes are necessary, they must be made before the certificate is granted. After all carpenter and other building work that might disturb the piping has been finished, and after the last coat of white plaster is on, the gas-fitter applies for the second inspection, which is principally one of pressure, and is made before any fixtures are hung. A pressure test identical with that of the first inspection is made; and if the piping is tight a certificate of second inspection is given. After the fixtures are installed, and the system is ready to receive gas, the third inspection is applied for. This, the last inspection, is principally one of fixtures. The entire system is put under a pressure of 6 inches water column, which must show no drop in ten minutes. Fixtures are examined for poor workmanship, objectionable design, &c., and all gas fixture cocks are carefully measured with a special gauge made for the purpose of determining whether they comply with the fixture cock specification.

There is very little to say about the actual physical house piping. It is simply a case of determining the proper location of, and the approximated consumption of gas for, each outlet—joining the various outlets to the riser; care being exercised so that the piping is of the correct size, properly supported, sloping in the right direction, &c

In ordinary dwelling houses, which form the great majority of cases, a system of house piping usually consists of a riser or pipe running vertically from a point in the basement near the meter, and supplying gas at each floor to a branch pipe, to which are connected the various outlets on that floor. In larger dwellings two or more risers may be run—all being supplied by one meter; while in the case of apartment houses a separate riser and meter supply each apartment. The meters are always installed in the basement, and in some cases (where the number warrants) a special meter-room is built. In modern manufacturing buildings, it is the custom to instal a trunk or common riser—the meter or meters being set on each floor, according to the number of tenants occupying it.

In most cases horizontal gas piping is run parallel with, and under, the floor boards. This not only makes it more convenient if the piping should ever, for any reason, need to be uncovered, but also assures that it will be supported by the joists, which may be notched out as near as is possible to their points of support. Vertical pipes are usually run in hollow partition walls. Wherever possible, it is preferable to have the gas-piping exposed to view. Piping should be laid level; but if not it should be sloped toward an outlet where it can be properly dripped—that is, where any condensation formed might be conveniently drained off.

After a system of piping has been properly installed, it needs very little attention under normal conditions. In time a certain amount of scale may form; and if this collects at any point the area will be reduced and the pressure lowered—thus causing a complaint from the consumer that the supply has been insufficient. By shutting-off the gas at the meter, and forcing air through the pipes by means of a hand-pump, these obstructions can usually be removed. The decision as to where each outlet should be placed to afford the proper distribution of light should be made by an illuminating engineer. Of course, there are innumerable little houses where the small rooms, usually square or oblong, do not allow fixtures other than central pendants or side wall-brackets to be installed; and in these cases it is of little importance that the various outlets are located by one who, perhaps, knows little or nothing about lumens, foot-candles, glare, coefficients of reflection, &c. On the other hand, there are thousands of larger residences, apartment houses, commercial buildings, and school houses, where the size of the rooms does not limit the type or location of lighting fixtures. In structures such as these, the location of the light sources should rest with one who is familiar with the principles of illumination.

The writer's attention was recently called to an instance where, in an operation of the better class of dwellings, the living-room was very poorly illuminated—due to the improper location of the outlet. By placing the fixture a few feet to one side, the lighting could have been greatly improved. This is a case where good illumination was evidently sacrificed in order to do away with running the extra pipe extension.

In piping houses for gas, the outlets should be properly located and the piping run to the outlets, instead of, as is the rule in so many cases, locating the outlets according to the easiest and least costly system of piping. If the members of the Illuminating Engineering Society (when the opportunity presents itself) will emphasize this point, better illumination will result in many instances.

The cost of installing a complete, modern system of gas-piping, if put in at the time the building is erected, varies from about one-eighth of 1 per cent. to 1 per cent. of the total cost of the building. These figures are based on the analysis of a great number of cases, ranging from an ordinary residence to large office and commercial buildings.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Importation of Gas-Mantles from Holland.

SIR,—Doubtless the following figures, in this connection, just received from the Statistical Department of H.M. Customs House, will be of interest to your readers:

	1913-14.		1914-15.
October	£544	..	£2,813
November	658	..	3,766
December	493	..	9,395
January	269	..	22,129
February	278	..	14,503
March	312	..	20,458
April	244	..	15,993
May	569	..	23,554
Total for eight months	£3,367	..	£112,611

Eight Months Prior to the War.		Corresponding Eight Months of War.
£3,367	..	£112,611

It will be seen that the present export of mantles from Holland to this country is more than 33 times what it was in the previous year.

We are assured by one of the largest Dutch manufacturers that his output, which, owing to the serious shortage in Holland of coal for gas making and of ramie yarn and also of magnesia mantle-rings, is little more than it was in 1914, represented then upwards of 50 per cent. of the total manufacture of Holland. The English mantle manufacturers are certain that the bulk of these goods are manufactured in Germany and not in Holland; and the best proof of this is the shortage of gas-making coal that exists in that country.

Your readers are probably aware that a mantle consumes in its manufacture from 1 to 3 cubic feet of coal gas; and it is a point for the gas engineers of this country to bear in mind that the import of German mantles through Holland for the eight months (of £108,000, approximately) represents a loss to the gas industry of this country, in sales, of from 20 to 30 million cubic feet of gas.

We make no mention of the loss of business to the British mantle industry, which we think will be obvious to, and deplored by, every patriotic engineer.

The bulk of these German mantles, we might mention, are packed in Holland under the trade marks of the English mantle wholesalers.

For THE VOLKER LIGHTING CORPORATION, LTD.,
C. S. GARLAND, Works Manager.

Garratt Lane, Wandsworth, S.W.,
June 28, 1915.

Aspects of Co-Partnership.—Letters which recently appeared in our "Correspondence" columns under this heading, are editorally referred to in these terms in the current number of the South Metropolitan Gas Company's "Co-Partnership Journal": "Last month, we commented on a letter sent by Mr. E. O. Guttridge to the 'JOURNAL OF GAS LIGHTING,' attacking the principles of co-partnership. That 'practical business man'—to quote his own description of himself—has written two more letters on the same subject, in which he adheres to his original position with a tenacity worthy of a greater knowledge and a more logical conclusion. He concludes his second letter by relegating theory 'to where all other practical men relegate it,' which is more suggestive than definite. There are at least two kinds of practical man—the 'rule-of-thumb man' and the technically trained man—and the latter takes care to investigate before relegating a theory to anywhere. But Mr. Guttridge throws in a suggestion for improving our present system. He thinks it would be better if 'the workers' share were subject to a fixed minimum.' Now, the worker's fixed minimum is the fixed rate of wages; and he gets that whether the shareholders get any dividend or none. For the shareholder there is no fixed minimum; in very bad times he may have to do without any return on his investment. The co-partnership scheme assumes that a dividend of 4 per cent. per annum is as fair for the shareholder as standard wages rates are for the worker; and when the divisible profits are more than sufficient to pay that very moderate wage to capital, the sharing of profits with the worker comes into operation. To talk about the cost of raw material annihilating the workman's share while the shareholder gets a big dividend is not what one expects from a 'practical business man.' It would not be so astonishing in the speech of a street-corner agitator."

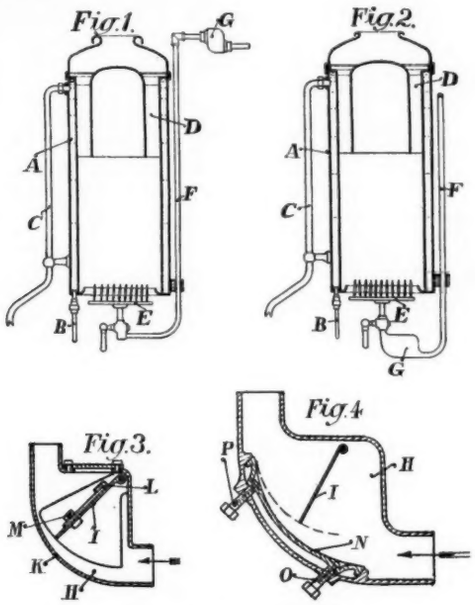
REGISTER OF PATENTS.

Water-Heaters or Geysers.

JUNKERS, H., of Aachen, Germany.

No. 5438; March 3, 1914. Convention date, March 7, 1913.

This invention has reference to closed geysers heated by gas, so as "to overcome the inconveniences caused by the fluctuations in the gas supply." It consists in the provision of a gas consumption regulator located in the gas supply pipe, as shown in the illustration of two typical forms of the apparatus fitted with the gas-consumption regulators mounted in front of the burner, and also typical forms of the regulator capable of being adjusted in accordance with the nature of the gas being burned.



Junkers' Regulatable Geysers.

Fig. 1 shows an arrangement in which the device for regulating the consumption by the burner is interposed in the gas-pipe leading to the heater. Fig. 2 shows the consumption regulator connected with the heater in order to form a complete unit. [The consumption regulator is not shown in detail, since it is not relevant to the essence of the invention.] Figs. 3 and 4 show a gas consumption regulator which may be adjusted in accordance with the kind of gas and with the local conditions.

In fig. 1, A is the usual vessel for containing the liquid, supplied with cold water through the pipe B; while the hot water issues through the pipe C. A heat exchanging device (of any known kind) is arranged at D; the heater being heated by the burner E, to which gas is supplied through the pipe F. G is a "consumption regulator" (of any kind) arranged in the pipe F.

In fig. 2 the "consumption regulator" is just in front of the vessel containing the liquid—that is to say, is in rigid and permanent connection with it even before the heater is set up, "in order to prevent any error in the exact arrangement of the consumption regulator in mounting the heater."

In place of a gas-consumption regulator acting, in these two instances, only so as to allow the passage of a constant volume of gas under fluctuations of pressure, use may be made, when it is desired to prevent the heater from incrustations of soot—in consequence of a difference in the nature of the gas or as the result of local conditions—of a regulator which is capable of adjustment, typical forms of which are shown in figs. 3 and 4. In fig. 3, the regulation is effected by a throttling flap which is interchangeable, and the component parts of which are adjustable and act in opposition to the pressure of the gas. Here H is a housing in which the throttling flap I is pivotally mounted. According to its position (which is determined by the gas pressure) in relation to the bottom K, the valve regulates the effective aperture, so that when the gas pressure is higher, the flap assumes a more horizontal position. The effective aperture therefore becomes smaller, and *vice versâ*. Consequently an identical volume of gas reaches the burner in all cases. The means by which the regulator can be adjusted in accordance with the varying calorific power of the gases under consideration, consists in this case in the provision of a weight L on the flap I, which weight is capable of being adjusted by the screw M. The adjustment enables the weight component of the flap, acting in opposition to the flow of gas, to be modified in accordance with the nature of the gas and the local conditions. Hence, when the gas has a higher calorific power than the gas for which the regulator was originally adjusted, the weight should be turned in the direction of the flap, so that the flap moves in a zone of narrower cross section than before, and a smaller volume of gas traverses the sectional passage under consideration.

In fig. 4, the means for adjusting the consumption regulator are such that the bottom N can be adjusted by two screws O P. The effect of this adjustment is similar to that described above, in which, as the calorific value increases the sectional area between the flaps I and the adjustable base N is reduced. The two screws O P enable the adjustment to be effected in accordance with the volume of air necessary to the combustion of the gas, or in accordance with the specific gravity, or with the volume consumed.

Quantitative Analysis of Gaseous Mixtures.

SIEMENS BROTHERS AND CO., LIMITED; a communication from Siemens and Halske Aktiengesellschaft, of Nonnendamm-bei-Berlin, Germany.

No. 6767; March 17, 1914.

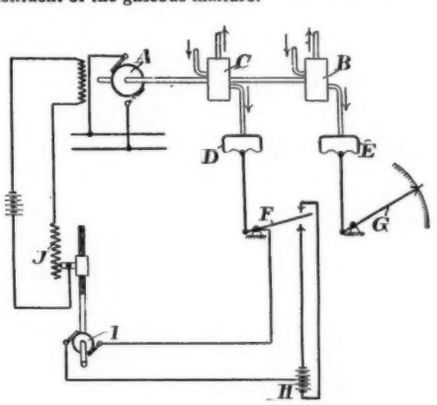
This invention is a modification of the arrangements shown in patent No. 28,943 of 1912, and forms an addition thereto.

It has been proposed, the patentees remark, to determine the density of a gas by measuring the difference of pressure between two points, one near the axis and the other near the circumference of a centrifugal blower, or the like, through which the gas is passed. It has also been proposed to compare the density of a gas with that of a standard gas under similar conditions by a comparison of the readings of the two instruments.

In the main patent specification in which a standard gas is also used, the density of a gaseous mixture is determined by the deflection of a single instrument, the moving parts of which are acted upon by the differences of pressure produced under similar conditions both in the gas to be examined and in the standard gas. It is also pointed out in the main specification that if a gas consists of known constituents, the proportion in which these constituents are present is known when the density is determined, and can consequently be directly indicated by suitable calibration of the instruments, the readings of which are determined by the relation between the density of the standard gas and of the mixture, and are independent of pressure and temperature if both gases are under the same conditions.

In the modification according to the present invention, the relative densities of the mixture and of the standard gas, and hence the proportion in which the constituents are present in the mixture, is directly given by the indications of a single instrument; but the instrument is only exposed to the pressure differences produced in the gaseous mixture—the pressure differences produced in the standard gas being automatically maintained at a constant value independent of changes of temperature and pressure. If the gaseous mixture is always exposed to the same conditions as the standard gas, the readings of the instrument which records the pressure differences set up at two different parts of the rotating gaseous mixture will also be independent of changes of temperature and pressure, and the proportions of the constituents of the mixture will consequently be directly shown on a single scale.

In order to maintain a constant pressure difference in the standard gas, its indicating device moves between two electrical contacts only a small distance apart, so arranged that when one contact is closed by means of the indicator the speed of the motor driving the centrifugal blower is increased, and when the other contact is closed the speed is decreased. In this way, a constant pressure difference is maintained at the manometer of the standard gas; and if care is taken that the other centrifugal blower rotating on the same shaft has the same pressure and temperature as the standard gas, the manometer connected to it will give indications which show directly the proportion present of a given constituent of the gaseous mixture.



Siemens and Halske's Gaseous Mixture Analyzer.

The arrangement employed is shown diagrammatically. On a shaft driven from a motor A are secured a centrifugal device B for the gas to be analyzed, and a similar device C for the standard gas. The gases are led into containers D E, which are closed by membranes below, the movement of which is transmitted to the indicators F G. The former indicator of the manometer for the standard gas plays between two contacts at a small distance apart. H is a battery and I a motor which inserts, by means of a spindle and nut, more or less of the resistance J into the energizing circuit of the motor A. If, for instance, the upper contact is closed by the indicator, the motor I is energized so as to cut out resistance; on closing the lower contact, more resistance is inserted. The speed of the motor A undergoes, in consequence, small fluctuations. The position of the pointer G at the indicating apparatus of the gaseous mixture will only alter according to the relative proportions in which its constituents are present.

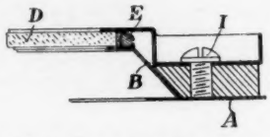
Gas-Meters.

WATLING, A. E., Commercial Gas Company, Stepney.

No. 13,586; June 4, 1914.

This invention relates to the fitting of the glass plates covering the indicating mechanism of gas-meters, and comprises improvements

whereby a fractured glass can be readily replaced without it being necessary to unsolder the frame of the meter to get at the glass.



Watling's Meter Index Arrangement.

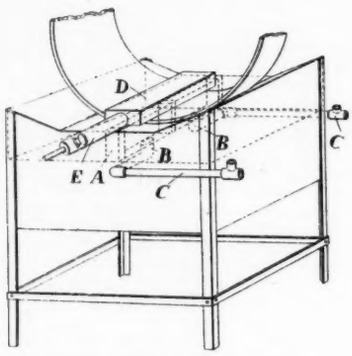
A indicates the usual gallery surmounting the meter proper, which carries the recording and indicating mechanism; the latter being covered by a glass plate D mounted within a frame B soldered to the gallery. According to the patentee's proposal, the glass plate is inserted into the frame from the front; the frame being provided with an inturned rabbet (to receive the glass) formed by turning in the metal of the frame and soldering a bead or wire E on it. The glass is bedded on putty and the cover which fits over the frame B is secured by screws I passing into tapped holes in small blocks soldered to the gallery, and which can be covered with sealing-wax and sealed. Should the glass be broken, it can be easily replaced by removing the sealing-wax, loosening the screws I, and taking off the cover.

Welding Furnaces.

TWIGG, W. R., of Luton.

No. 20,138; Sept. 24, 1914.

This invention relates more particularly to furnaces for welding joints in cylindrical articles which can be subjected at the point of weld to flames arranged to play on both the inner and outer surfaces. The furnace is provided with a readily movable and independent heater having a groove in which the flame from an attached burner can play, so as to concentrate the flame of the heater upon the inner side of the article being welded.



Twigg's Gas-Welding Furnace.

The perspective view of the furnace in use shows the hearth formed of fire-clay or other refractory material contained within a sheet-iron casing rectangular in plan. The upper surface of the hearth is formed with two angular cheeks which slope downwards and inwards from the upper edges of two opposite sides to a flat area. The furnace hearth thus offers a surface of convenient shape for such objects as a curved plate, as it prevents them from rolling while being operated upon.

Parallel with the angular cheeks, and midway between them, a slot, closed at each end by walls A and divided, if required, by a partition, is formed in the flat area of the hearth, in which bunsen burners B, of flattened cross section, are arranged with their mouths a short distance below the level of the hearth. These burners are fed from pipes C connected to any suitable source of supply outside the hearth.

For heating the joint being welded on the inner (or upper) side, an independent heater D is employed. This (also rectangular in plan) is composed of fire-clay material encased in sheet iron. A bunsen burner tube E leads into a cavity formed in the underside of the heater, and which is open at the end remote from the end where the burner enters. The burner of the heater is connected by a flexible tube to the gas supply.

In operation the burners B are first lighted and the article to be operated upon is placed in position on the upper surface of the hearth —the joint to be welded being arranged directly over the flame. The burner E of the heater D is then lighted; the flame being applied to the inner or upper side of the joint.

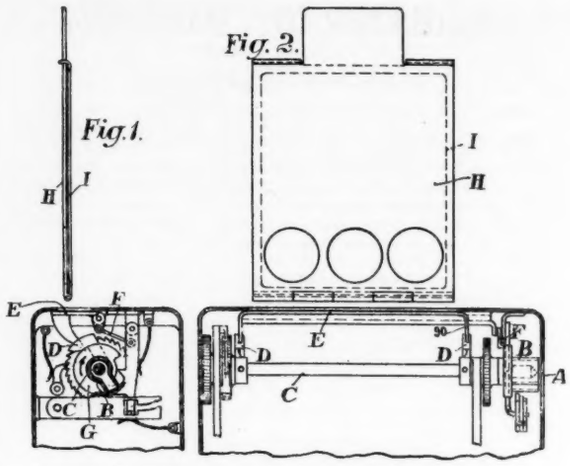
Record Printing and Registering Apparatus for Meters.

KOLÁR, N., of Budapest, Hungary.

No. 19,251; Aug. 25, 1913. Convention date, Aug. 26, 1912.

This is an improvement on patent No. 25,959 of 1912, which described apparatus for recording and printing mechanism for gas-meters, by merely inserting an account form into it and actuating the printing mechanism by turning a key. The improvements relate to means for inserting the account form to be printed and to safety devices for preventing misuse of the apparatus.

Figs. 1 and 2 are side and front views of the frame serving for the insertion of the account form. Fig. 3 shows, in section, sufficient of



Kolár's Meter Consumption Registering Apparatus.

the apparatus to make clear the safety device serving to prevent misuse. Fig. 4 is a front view of the safety device.

The mode of operation is as follows: The position of rest of the various parts is as shown in fig. 3. The key, after insertion through the key hole A into the sleeve B, can be turned in the direction of the arrow, carrying with it the sleeve and spindle C. During this movement the wards of the key operate on portions of the lock until the key cannot be turned farther. At this moment the segments D have been turned sufficiently far to release the noses on the flap E. Pressure is now applied to the flap by means of the frame, holding the account form so as to open the flap, and also by means of the connecting rod F to press a pawl back and release the disc G. The frame H I can now be pushed into the apparatus; and the spindle C is rotated further by means of the key and the printing of the account accomplished.

Should a false key be inserted, the holding levers would not take up such a position as to permit of the yielding of the pawl, so that neither could the flap E be depressed nor the disc G released. The key could not therefore be turned further round, and the backward turning of the key is prevented by the ratchet wheel. As the key has been already turned so far that the wards are no longer opposite the key hole A, the key cannot be removed, and is held fast in the apparatus, so that it would "lead to the identification of the operator."

The coupling of the counting trains of the printing device with the counting train of the meter is performed preferably by a flexible shaft inserted through a boring made at the casing of the meter and coupled with the indicating drum of the counting train of the meter.

APPLICATIONS FOR LETTERS PATENT.

9058.—STEWART, A. W., "Pipe-joint." June 21.
9067.—LEA, J. E., "Measuring the flow of gases." June 21.
9072.—VALENTINE, H. S., "Supports for gas-fires." June 21.
9104.—LUCAS, O. D., "Distilling coal, &c." June 21.
9152.—HALL, W. A., "Distilling coal." June 22.
9155.—STEENBERGH, B. VAN, "Manufacturing carburetted hydrogen gas." June 22.
9156.—THOMAS, W., "Revolvable retorts." June 22.
9162.—RITTMAN, W. F., "Manufacture of light hydrocarbons." June 22.
9163.—RITTMAN, W. F., "Manufacture of benzene, toluene, &c." June 22.
9214.—DRAKES LIMITED, and DRAKE, W. A., "Regenerative furnaces." June 23.
9296.—TROQUAY, J., "Controlling gas-valves." June 24.
9341.—GEE, J. E., "Regulating temperature in closed chambers." June 25.
9369.—AIRD, K., "Burners for gas-fires." June 26.
9375.—PRIOLEAU, J. R. H. & W. L. ST. J., "Obtaining the volatile gases distilled from carbonaceous material." June 26.

Public Lighting Allowance at Cheshunt.—In a letter of reply to the Cheshunt Urban District Council, Mr. W. B. Randall, the Engineer and Secretary of the Waltham Abbey and Cheshunt Gas Company, wrote that his Directors considered that their offer of an allowance of 6d. per 1000 cubic feet of gas not used for public lighting was a liberal one; but in order to try and meet the views of the Council, they were prepared to agree, without prejudice, to an addition of 3d. per 1000 cubic feet, making a total allowance of 9d. The letter continued: "They further desire me to point out that since the date of the first offer of a rebate the price of coal and other raw materials, and labour, has considerably advanced. The Directors are still anxious to avoid increasing the price of gas to ordinary consumers; but they have had to reduce their dividend on all classes of shares 1 per cent. from July 1 last year." The Works Committee unanimously recommended that the offer of the Company should be accepted, but without prejudice to the rights of the Council in the event of any legal decision being hereafter made with reference to contracts for public lighting entered into by local authorities which have been varied by orders of Government authorities under the Defence of the Realm or other Acts. The recommendation was agreed to.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills :—

Bill brought from the Commons, read the first time, and referred to the Examiners : Gas and Water Provisional Orders (No. 2).

Bill read a second time and committed : Gas and Water Provisional Orders (No. 1).

Bills read the third time and passed : Chelmsford Corporation Gas, Lurgan Urban District Council.

Bills Royal Assented : Altrincham Gas, Ammanford Gas, Warwick Gas.

The Weardale and Consett Water Bill has been referred to a Select Committee, consisting of M. Bristol (Chairman), E. Craven, V. Falkland, L. Annaly, and L. Aberdare ; to meet to-day.

HOUSE OF COMMONS.

The following further progress has been made with Bills :—

Bills reported : Northwich Gas [Lords], Sutton District Water [Lords].

Bills considered : Prescot Gas [Lords], Spennymoor and Tudhoe Gas [Lords].

Bills read a second time : Kilmarnock Gas Order [Lords], Plymouth Corporation.

Bills read the third time and passed : Altrincham Gas [Lords], Gas and Water Provisional Orders (No. 2), Warwick Gas.

A petition has been deposited by Francis Monckton and Walter T. C. Giffard against the South Staffordshire Water Bill [Lords].

The Cheshire Lines Committee have withdrawn their petition against the Northwich Gas Bill, which (being unopposed) has now been referred to the Committee on Unopposed Bills.

Coal Supply

In the House of Commons on Monday of last week,

Mr. NEVILLE asked the President of the Board of Trade whether he could state the average number of days per week worked by collieries in the month of May, as compared with the average number of days worked by coal miners at such collieries during the same period.

Mr. RUNCIMAN (the President of the Board of Trade) said that the average number of days per week on which coal was hewn and wound at collieries in the United Kingdom in May last was 5·64. The Board had no information as to the average number of days worked by the miners in the same period ; but some particulars on the subject for an earlier period would be found in the report of the Coal Mining Organization Committee, recently published.

Mr. ANDERSON asked the President of the Board of Trade if he was in a position to announce his policy as to limiting the price of coal ; and whether he was aware that the coal companies were now making their contracts at increased rates for twelve months ahead, so that action, unless immediate, would be ineffective.

Mr. DUNCAN MILLAR asked the President of the Board of Trade whether he could now state what steps he proposed to take to carry out the recommendations of the Committee appointed to deal with the question of the retail price of coal ; and whether, having regard to the representations received by him from many members and others, and to the failure on the part of the coalowners to come to a proper arrangement, he would now fix the price of coal for home consumption throughout the United Kingdom.

Mr. RUNCIMAN, in reply, stated that several of the recommendations had already been adopted. He hoped to be able to make a further announcement on the subject shortly.

War Badges for Employees.

Mr. TOUCHE asked the Under-Secretary of State for War if he was aware that the Manager of the Heston and Isleworth Electricity Works, in response to an application for war badges for certain skilled employees on his staff, containing the names of firms engaged on Government work to which power was being supplied by his works, was informed that the issue of official badges could not be authorized, on the ground that no power was being supplied to any factory manufacturing munitions of war ; that his application was made as the result of a communication from the War Office to the Secretary of the Associated Municipal Electrical Engineers (Greater London), in which it was stated that a system had been instituted by which badges for skilled employees of suitable age and willing to enlist if called upon to do so could be obtained on application to the War Office ; and that the application of this system was suggested by the military authorities to the Associated Municipal Electrical Engineers as a means of retaining their skilled employees. Was he aware that the attitude of the War Office towards the application for badges did not seem to accord with the official statement to the effect that several electrical companies had been offered such badges for issue to men of recruitable age who would be willing to enlist in the event of emergency ; and would he say why there was this inequality of treatment in regard to the issue of badges to skilled employees of electrical services ? If it represented a change of attitude, would he consider the advisability of its modification, with a view to granting badges to the skilled employees of the Heston and Isleworth electricity works, and to the employees of other companies similarly situated.

Mr. H. W. FORSTER, in reply, said : There has as yet been no change in the procedure as regards the issue of badges to employees at electric power stations. The position is as stated in the first part of the question ; but the power stations must be supplying power for the manufacture of munitions.

NOTTINGHAM GAS RESERVES.

After exhaustive inquiry, the Nottingham Corporation succeeded last week in securing, with unimportant modifications, the confirmation by the House of Lords Committee of the measure, which had passed its earlier stages in the Commons, for spending large sums upon improving the navigation of the Trent between Nottingham and Newark and acquiring certain statutory rights of the Trent Navigation Company. One important part of the measure, which the Lords Committee have now reported for third reading, is the power which it gives to draw upon the gas reserves and other funds of the municipal trading undertakings, in carrying out the scheme.

NORTHWICH GAS BILL.

The Unopposed Bills Committee of the House of Commons last Thursday sent this Bill forward for third reading. The measure has already been passed by the House of Lords [see "JOURNAL," April 20, p. 155].

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents) explained the modifications which have been made in the Bill since it was first deposited. These were given in detail in our columns on the previous occasion. Briefly, it may be stated that, as a result of negotiations with the Urban District Council, a proposal to convert the Company from a maximum price company to a sliding scale one has been withdrawn, as also has the proposal to acquire a new site for the gas-works. The calorific value testing clauses have been amended, and now contain the standard of 500 B.Th.U., with no margin. The main objects of the Bill now, therefore, are to raise £45,000 of additional capital, and to convert the existing shares of the Company (except the preference) into uniform 6 per cent. stock. This figure has had to be adopted, as it has been realized that it will be impossible in future to raise new capital at par on the basis of 5 per cent.

For some days the Bill was in the list of Opposed Bills, to be heard by Sir Edwin Cornwall's Committee in connection with a petition by the Cheshire Lines Committee ; but this was subsequently withdrawn.

SUTTON AND DISTRICT WATER BILL.

This Bill was last Thursday sent forward for third reading by the Unopposed Bills Committee of the House of Commons. It has already passed the House of Lords [see "JOURNAL," April 20, p. 156], when the facts were set out.

SOUTH STAFFORDSHIRE WATER BILL.

Consideration of the Bill promoted by the South Staffordshire Water Company was commenced last Tuesday, by a Committee of the House of Commons presided over by Sir EDWIN CORNWALL. The Bill has already passed the House of Lords. [See report in the "JOURNAL" for May 4, p. 286.]

Mr. J. D. FITZGERALD, K.C., Mr. CLODE, K.C., and Mr. CAVE appeared for the promoters. The only opponents were a combination of local authorities, represented by Mr. TYLDESLEY JONES. The Local Authorities concerned are Dudley, Smethwick, Walsall, Sutton Coldfield, Wednesbury, Brierley Hill, Cannock, Sedgeley, and Halesowen.

Mr. CLODE, in presenting the Bill to the Committee, outlined the main features which were given in our columns at the time the House of Lords Committee considered it. The opposition is not concerned with the general scheme of the Bill, but with a number of details. The most important one is in relation to clause 32, which deals with the method of raising capital. The clause is as follows :—

(1) Notwithstanding anything contained in the South Staffordshire Water-Works Acts and Order 1853-1913 or in Part 2 of the Companies Clauses Act, 1863, all stock created under the powers of the section of this Act of which the marginal note is "Power to Raise Additional Capital," and of ordinary or preference stock hereafter created or disposed of under the powers of the Order of 1901 or Act of 1909, may, subject as hereinafter in this section provided, be disposed of at such times and to such persons and on such terms and conditions and in such manner as the Directors think advantageous to the Company.

(2) Such stock shall be in the first place offered to the public.

(3) Such stock shall not be disposed of at a price below the price which may be from time to time fixed as the best price at which the same, in his opinion, can reasonably be disposed of by the Company, by the President of the Birmingham Stock Exchange, or some person nominated by him.

(4) A copy of any prospectus offering the stock for sale shall be filed with the Board of Trade as soon as reasonably practicable after the issue thereof.

(5) The Company shall, so soon as practicable after the expiration of each year ending the 31st day of December, send to the Board of Trade particulars of stock created and issued by the Company during such year, and such particulars shall state the total amount of stock sold during that year, and the price obtained for the same and the manner in which the same was issued.

Continuing, Mr. Clode admitted that this was a departure from the usual auction clauses in Gas and Water Bills ; but, under Standing Order No. 188 of the House of Commons, it was open to a Committee

to vary a model clause, and they were then bound to report to the House their reasons for such modification. The matter had been discussed in the House of Lords; but there the promoters did not have to run-counter to any Standing Order, because the auction clause in the House of Lords only applied to Gas Bills and not to Water Bills. The reason for the alteration in this case was that, under the auction clauses, it was frequently found difficult for a company to sell stock, as the reserve price which had to be fixed was not known, and people refused to buy a "pig-in-a-poke." Consequently stock was frequently put up to auction; and if it was not sold then, it could be offered to ordinary shareholders. These, it had been found by actual experience, refused naturally enough, owing to the knowledge that the shares had not been taken up well at the auction. Then the company were bound to put the stock up to auction again; but it would only fail, and finally it meant that the Directors could deal with the stock in the manner they thought best.

The CHAIRMAN remarked that this was a general objection to the clause.

Mr. CLODE agreed, but said that he could show how the objection applied to this Company particularly. Only those people intimately acquainted with the affairs of a company knew the reserve price; and consequently it was not difficult in that case to sell the stock. In a large Company such as this, however, which appealed to a larger clientele, there was not sufficient information among the people whom it was desired to attract as to the affairs of the Company, and the difficulties he had mentioned occurred. The Company had tried the effect of the auction clauses, and found them a complete failure. There was no sinister design in the altered clause for getting the shares into the hands of the existing shareholders—in fact, it was expressly laid down that the shares must in the first case be offered to the public; and it was confidently believed clause 32 would ensure a better price than could be obtained under the auction clauses.

The CHAIRMAN remarked that there was no provision for advertising stock as in the auction clause.

Mr. CLODE thanked the Chairman for this criticism. It had missed the attention of those who had carefully considered the matter, including the authorities of the other House; but he certainly thought that it would improve the clause. Some objection, he believed, would also be taken to clause 33, which allowed for underwriting; but no large sum of money could be obtained without underwriting. As to precedents for the modification of the auction clauses, he mentioned the following Bills: Barry and Cadoxton Gas and Water (1889), Bognor Water (1891), Filey District Water (1891), Rhyl District Water (1892), Bexhill Water and Gas (1892), Bridlington Water (1895), York Water (1895), Harpenden Water Order (1899), Rickmansworth and Uxbridge Valley Water (1900). Another clause to which exception was taken was clause 44, providing that the Company and the local authorities could come to agreements whereby the authorities could give the Company a guaranteed revenue for bringing water into a district. He failed to see why this should be objected to, as the Bill already contained the Model Clauses with regard to property owners' guarantees—namely, a revenue equal to 10 per cent. on the cost of the main for three years. Cases, however, arose where a local authority might desire the Company to take water to a district which was just developing, and clause 44 left it to the Company and the local authority to make arrangements whereby the latter could give a guaranteed sum for getting the water. At present a local authority could not do this under the general law. It was suggested by the opponents that any such guarantee should only be 5 per cent. of the cost of the main. He believed that the only other point of objection was in regard to clause 45, which authorized a charge of 20s. per annum where a hose pipe was used for watering gardens or washing carriages and motor-cars. There were many cases of this nature in various Acts; but the amount ranged from 10s. to 20s. It was felt in this case that 20s. was a reasonable figure.

Evidence having been heard in support of Counsel's statement,

Mr. TYLDESLEY JONES, addressing the Committee on behalf of the opponents, submitted that no case had been made out for varying the terms of the auction clause in this instance. The chief arguments seemed to be against the absence of knowledge of the minimum price on the part of probable purchasers of the stock. But there was nothing in the auction clause to prohibit a minimum price being published, although equally he agreed there was nothing in the clause which said that the Company should publish the minimum price. All the precedents mentioned by Mr. Clode related to new companies or struggling companies, who conceivably would have difficulty in raising capital under the auction clauses; but this remark could not apply to the South Staffordshire Company, inasmuch as their shares were quoted on the Birmingham Stock Exchange, and anyone desirous of tendering could easily find out the position of the Company and get some idea of the price at which he would have to tender in order to obtain the stock. If by some addition to the auction clause it could be made clear that the Company could publish the minimum price, the whole difficulty would be cleared away. As regards the question of guarantees by local authorities, he submitted that 5 per cent. for ten years was more favourable to the Company than 10 per cent. for three years. Moreover, several agreements on this basis had actually been entered into by the Company with a number of local authorities. The question of the hose pipe affected the rateable value of the premises. At present all consumers were charged on the rateable value basis; and where a garage or coach-house was attached, the rateable value upon which the water-rate was based included the rateable value of the coach-house. By wishing to make an additional charge, the Company were endeavouring to get the water used in the coach-house or garage paid for twice over. In these circumstances, 10s. seemed to him to be a reasonable figure.

The Committee, in passing the preamble of the Bill, decided that the auction clauses would have to be inserted with some provision to enable the Company to indicate the minimum price. As to the guarantee by local authorities, this clause would be left merely as an enabling clause. But the terms of the guarantee applicable to owners of property—namely, 10 per cent. on the cost of the main for three years—would be inserted. As to the hose pipe, the Committee thought a charge of 20s. per annum was reasonable.

MISCELLANEOUS NEWS.

THE INSPECTION OF GAS-LIQUOR AND OTHER WORKS UNDER THE ALKALI ACT.

Reports of District Inspectors.

The recently-issued annual report of the Chief Inspector under the Alkali Works Regulation Act, 1906 (Mr. W. S. Curphey), was noticed in the last issue of the "JOURNAL," and opportunity may now be taken of dealing similarly with the reports of the District Inspectors.

WORK IN IRELAND.

The first report is by Dr. T. Lewis Bailey, the Inspector for Ireland, where the number of works registered during 1914 showed an increase of four over those registered in the previous year, and there was an increase of four in the number of processes under inspection. There are 67 works registered, in which 90 processes are carried on. Of the 182 visits paid and 133 tests made during the past year, 12 visits and 13 tests were made by Mr. E. G. Ballard, who retired in the early part of the year, and 43 visits and 38 tests were made by Mr. Harold J. Bailey. There has been nothing calling for very serious criticism in any of the works. There have been a few minor troubles; but, on the whole, the works have been carefully conducted, and necessary repairs have been attended to in all cases. As to sulphate of ammonia and gas liquor works, it is remarked that most of the plants are small and are at gas-works. Three new works were added during the year. The quantity of ammonium salts produced during the year showed an increase of 8½ per cent. At one works liquor ammoniæ is produced. The direct method of production has been adopted at one works. The proportion of liquor distilled by the continuous process was 98·2 per cent.; and of liquor distilled by the intermittent process, 1·8 per cent. The proportion of sulphuretted hydrogen treated by various methods, in terms of sulphate made, per cent. of total make, was: By oxide of iron, 87·7; by burning, 0·7; precipitated by metallic salts, 11·6.

NORTH OF ENGLAND.

In the North of England district, Mr. E. Morley Fletcher reports that the number of works registered during the year was 165. There are 225 separate processes under inspection—an addition of one over the previous year. There were 641 visits paid to registered works in the district during the year, and 583 quantitative tests were made of the gases leaving the various processes.

Three new works were registered for the manufacture of sulphate of ammonia during the year. Two were in connection with the recovery of bye-products from coke-ovens, the other was a gas-works. Here operations had been carried on for some years in ignorance of the requirements of the Act; and this plea was accepted on payment of back-fees.

The direct recovery of ammonia as applied to gas-works continues to give satisfaction at the one works in the district where this method is in use. The chief feature of the year is the supplying of Middlesbrough with coke-oven gas from a bye-product coke-oven works.

The following statement gives particulars regarding the methods of utilizing gas-works liquor and the means employed for dealing with the noxious gases evolved: Proportion per cent. of sulphate of ammonia made by continuous processes, 99·6; proportion of the sulphuretted hydrogen treated by the various methods of disposal in such works in terms of the sulphate equivalent of the liquor distilled: By Claus process, 48; by oxide purification, 52.

CHESHIRE, NORTH WALES, AND PART OF LANCASHIRE.

This district is, in addition to Ireland, under the care of Dr. Bailey. During the past year there has been an increase of three in the number of works registered, and of five in the number of processes under inspection. There were 498 visits made in the district and 582 tests. There are 94 works registered, and 152 separate processes of manufacture. The works generally have been well conducted.

The gas liquor works have been frequently inspected, and the absorption of sulphuretted hydrogen has invariably proved satisfactory. At the sulphate and muriate of ammonia works all continues satisfactory. In the manufacture of sulphate of ammonia from gas liquor all plants use the continuous process. The proportion of sulphuretted hydrogen treated by the various processes, in terms of sulphate of ammonia made, per cent. of total liquor distilled, is as follows: By Claus process, 7·5; absorbed in oxide of iron, 42·8; precipitated by metallic salts, 49·7.

There is an increase of one in the number of registrations of tar-works. It has been necessary to call attention on very few occasions to minor details; but beyond this there is no cause for adverse comment. One plant was found working without registration.

WIDNES, RUNCORN, AND LIVERPOOL.

Mr. Herbert Porter has charge of the district comprising Widnes, Runcorn, and Liverpool; and he reports that the number of registered works in this area during the year was 41, with 102 separate processes of manufacture. The number of visits paid was 517, and 765 tests were made. There was considerable activity in this district in extending existing processes and in the erection of plant for new ones owing to the war, in addition to which new works are being erected. Owing to the shortage of labour, some difficulty has been experienced in working and maintaining various chemical plant in the desired state of efficiency, in face of the increased demands upon the trade during the last two months of the year.

The different methods of treating sulphuretted hydrogen evolved from gas-works liquor are shown in terms of sulphate of ammonia per cent. of total make: Absorbed by lime or oxide of iron, 17·1; by combustion, 7·3; by other methods (including absorption in ammoniacal liquor), 75·6. All this class of plant has been properly worked during the year.

There are eight tar-works in the district. Large stills seem, it is

remarked, to be the order of the day; and attention is being paid to improved methods of firing them. All the plant was properly worked during the year.

North and East Lancashire, and Part of Yorkshire.

The number of works registered in the area embracing North and East Lancashire and part of Yorkshire is 126, and of processes 239. Mr. H. J. Bailey reports that the chemical-works in this district were adversely affected during the spring and early summer, owing to the uncertain state of the cotton trade; but after the first few weeks of the war considerably increased activity resulted in many departments, and the shortage of sulphuric acid, due to greatly increased demands, became quite a serious trouble to some manufacturers towards the end of the year. Labour difficulties have also been great during the closing months of the year, due to so many process men having enlisted, and time being required to train new employees in their duties. However, in spite of the great difficulties of the situation in these early months of the war, it is, he says, gratifying to be able to state that no serious grounds for criticism have arisen.

There were 59 works registered under the heading of Gas Liquor and Sulphate and Muriate of Ammonia, in which the separate processes were: Sulphate and muriate of ammonia 54, gas liquor 11. The proportion of ammonia distilled by the continuous process was 97·1 per cent. of the total. The methods of disposal of the foul gases produced in the distillation of gas-works liquor for the production of sulphate of ammonia were as follows (proportion of sulphuretted hydrogen dealt with in terms of sulphate produced): To vitriol chambers, 30·7 per cent.; by Claus process, 10·8; by oxide purifiers, 46·3; by combustion, 12·2. One works at which the vitriol chambers were destroyed by fire resorted to the temporary expedient of destroying the foul gases by combustion. The average of tests taken at the chimney to which these gases were conducted was 0·88 grain as sulphur trioxide per cubic foot. Ammonia liquor produced at coke-oven plants has been distilled at five works. At two of these concentrated liquor only is produced, at two the Claus kiln deals with the foul gases, and at one works the foul gases were destroyed by combustion. The average total acidity of the chimney gases in the latter case was 0·80 grain per cubic foot, expressed in terms of sulphur trioxide; and no free sulphuretted hydrogen was found. At these works a new sulphate plant has come into operation, and considerably relieved the pressure of work—thus enabling proper repairs to be made from time to time. These works have all been carried on during the past year with freedom from accident or cause of complaint.

There are 26 tar-works registered. No ground for criticism arose in connection with this class of works, except in one case, where the foul-gas pipes from the worm-end had been disconnected from the fire. It was found to be a case of neglect of workmen who had been effecting repairs, and was speedily rectified on the manager's attention being drawn to the defect.

East Midland.

Mr. Robert D. Littlefield reports that the number of registered works in this district at the end of the year was 151; the total number of processes scheduled for inspection being 243. During the year a total of 681 visits and 777 chemical tests were made.

The proportion of gas liquor distilled by the continuous process amounted to 99 6 per cent. of the total. The proportion of the sulphuretted hydrogen treated by the separate methods in such works in terms of the sulphate of ammonia equivalent of the liquor distilled was: To vitriol chambers, 33·8 per cent.; by Claus process, 24·3; by oxide purification, 41·9. The average total acidity of the chimney gases at those coke-oven works in which, on account of the working conditions, the combustion method is accepted as the best practicable means of disposal of the sulphuretted hydrogen, was equivalent to 0·79 grain of sulphuric anhydride per cubic foot. This figure compares with 0·9 grain for the previous year.

The following figures relating to the total output of ammonia compounds in this district during 1914 are, says Mr. Littlefield, interesting. Using the sulphate of ammonia equivalent as the basis of the calculation, there is a decrease of 1·4 per cent. compared with that produced in 1913. Separating the amount of sulphate made under headings "ordinary gas-works" and "coke-oven works," there is a decrease of 3·7 per cent. in the former, and an increase of 2 per cent. in the latter. The total output on the basis of the sulphate of ammonia equivalent is proportioned as follows:—

	1914.		1913.
Gas-works	38·15 per cent.	..	39·1 per cent.
Carbonizing works . .	1·26 ,,	..	1·5 ,,
Coke-ovens	58·34 ,,	..	56·3 ,,
Producer gas. . . .	2·25 ,,	..	1·5 ,,

South Midland and Norfolk.

Dealing with this district, Mr. Edward Jackson states that during the past year there has been an increase of twelve in the number of works registered, and of nineteen in the number of processes under inspection. There were 692 visits paid—every works in the district being inspected and reported upon.

There are 123 works registered in the district where sulphate, chloride, or carbonate of ammonia is manufactured or gas liquor concentrated. At 116 works sulphate of ammonia is produced, at 6 chloride of ammonia, while at 13 other works gas liquor is concentrated. There are, therefore, 135 plants under inspection where ammonia compounds are manufactured.

Ten new sulphate of ammonia plants have been registered this year. Five are at ordinary gas-works. Three of these are for the usual liquor distillation process, and are supplied with ample condensers; and in each case there are two oxide-heap purifiers supplied with hydraulic change valves. The other two gas-works plants are for the direct sulphate of ammonia process. Two of the other new plants are attached to coke-ovens, and both are designed to produce sulphate of ammonia by the direct process. The remaining three plants are producer-gas plants. One new small gas-liquor plant, for making purified ammonia, has been erected, in addition to the above.

The direct sulphate of ammonia process for ordinary gas-works continues to make progress. There are five such plants now in the district; and they appear to give every satisfaction, and the salt produced is a good colour. The recently-erected sulphate of ammonia plants at coke-ovens have also been of the direct-recovery type. There are 25 bye-product coke-oven plants now working in the district; eight producer-gas plants of the Mond type, and one of a smaller character; also two iron-works recovering ammonia from blast-furnace gases. The remaining plants are for the ordinary gas-liquor distillation method, and are of very much the same principle, producing sulphate of ammonia, or for gas-liquor concentration only.

There has been a further increase of seven tar-works registered this year, bringing the total number of works in the district where tar is distilled up to 55. At three of the new works which have been put into operation this year, "prepared tar" for road treatment only is produced. In each case the foul gases from the closed receivers attached to the condensers are arrested in small lime purifiers. At two of the other works the tar-stills are attached to coke-oven plants; and the remaining two tar-plants are in connection with large "power-gas" plants. In all these works the uncondensed vapours from the distilling operation are sent into a fire. Pitch-coolers with suitable provisions for compliance with Act requirements have been attached. The works previously registered have been carried on as usual. In some cases, further improvements have been effected to more completely prevent nuisance arising from both uncondensed vapours from the stills as well as from the pitch-coolers

South and South-West of England.

In his report on the South and South-West of England district, Dr. Alfred C. Fryer states that the total number of registered works was 180, and of processes inspected 250—an increase of eight works and eleven processes since 1913. The total number of visits of inspection to registrable works was 718, and of tests taken 562.

The number of works where ammonium sulphate or ammonium chloride is manufactured has now risen to 110. Of the four works which have reconstructed their plants, two are on the continuous system, and two on the direct method of sulphate manufacture; and it is, says Dr. Fryer, interesting to record that the five new registrations are all on the latter method. In one case the new plant is at a gas-works situated on the banks of the Thames; and it is so arranged that no effluents are allowed to escape either into the river or into the town sewer. This method must prevent a considerable loss of ammonia from storage-tanks for gas liquor; for in some works there is no difficulty in detecting the loss by the nose. As the tendency is now to get nearer 30 lbs. of sulphate of ammonia per ton of coal carbonized, it is needful to observe every known economy; and for this reason it is a wise precaution to work up gas liquor as soon as possible after it has been made when the direct process is not in use, for ammoniacal liquor is most difficult to store without loss. In addition, there should be a saving of lime in the still, as the proportion of "fixed" ammonia would be less. It is also well to carry the gas-liquor pipe to the bottom of the storage tank, to prevent the splashing and agitation of the liquor; while in some cases a light film of oil is laid on the stock of liquor to prevent the loss of ammonia. Paraffin has been tried; but as it possesses a tendency to evaporate, a less volatile oil has been preferred.

The importance of the conservation of ammonia has, he adds, been forcibly brought home to gas engineers during the last few years. A paper dealing with this matter was read by Mr. Ernest H. Clarry in May, 1914, before the Wales and Monmouthshire District Institution of Gas Engineers,* embodying results obtained by a new scrubbing plant which had recently been put into operation at Cardiff. The objective in using the new plant was the quick removal of the thick tar from the gas prior to condensation; easy and efficient condensation to retain the greatest quantity of the calorific and candle-power constituents; entire removal of even the lighter tars before washing; the formation of a strong ammoniacal liquor; lessened exposure of ammoniacal liquor to the atmosphere and reduced pumping; and the retention of all available ammonia absorbed by the water.

"Hurdle" grids have been used in one or two of the oxide of iron purifiers for sulphate plants in this district; and the managers of these works are now able to express some opinion upon them. Two things, Dr. Fryer remarks, seem noticeable—viz., as there are a large number of vertical pieces of wood in the purifiers, the gas has a tendency to ascend upwards and alongside such uprights; and the difficulty of removal of the spent oxide for revivification is considerable when the hurdle grids have to be dug out of a comparatively hard material. Consequently, the wear and tear is apparently more than with the ordinary grids.

The yellow colour noticed occasionally in sulphate of ammonia is due to the arsenic in the acid being precipitated by the sulphuretted hydrogen evolved in the process as arsenious sulphide. Some experiments have been made this year with the acid when this characteristic yellow colour was produced; and it was found that if it contained about 0·01 per cent. of arsenic, a very slight colour was given to the sulphate, while 0·03 per cent. gave a strong colour. It was also noticed that if the acid contained traces of copper as well as arsenic, there was a tendency to form a grey-brown salt; and when larger quantities of copper were present the salt became a dark grey. In one instance the acid did not contain more than 0·02 per cent. of arsenic; but the scum on the saturator had such a yellowish-brown shade that it was examined, and as much as 25·5 per cent. of cadmium sulphide was found in it.

The following statement shows, in terms of sulphate of ammonia made per cent. of total make, the methods in use during the past year for the treatment of sulphuretted hydrogen in the different works where sulphate of ammonia is manufactured from gas-works liquor, together with the proportion of gas so treated: By oxide of iron purification, 70·4 per cent.; by the Claus process, 15; by neutralization after combustion, 6·2; by hydraulic main, 8·4.

South Wales and Monmouthshire.

Dr. Fryer also reports upon the South Wales and Monmouthshire district, where the total number of registered works was 125, and of

* See "Journal," Vol. CXXVI., p. 951.

processes inspected 164. The total number of visits of inspection to registrable works was 625.

Although two coke-oven bye-product plants are worked on the direct methods of sulphate of ammonia, yet up to the present no such installation is employed at any of the gas-works in South Wales where the gas liquor is run to waste. This form of plant is being considerably extended at gas-works in the South of England, where the manufacture of sulphate of ammonia is considered a source of profit. A similar method would, it is pointed out, be equally beneficial to those smaller gas undertakings in South Wales, where the gas liquor is neither worked up into sulphate nor sold.

As long ago as 1897, Dr. Fryer met some of the colliery owners at the offices of the Thursis Copper-Works, Cardiff, and they discussed together the problem of the recovery of the bye-products from the manufacture of coke. This question was referred to in the 34th annual report; but the matter remained dormant for seven years. In the meantime, a change was taking place in the introduction of better coal-washing machinery; and the first large company to undertake the erection of the necessary plant was the Great Western Colliery Company, Limited, at their works at Pontypridd. These works were registered in 1904; and since that date as many as nine coke-oven bye-product plants have been erected in South Wales, and two more are in process of completion.

The following figures show, in terms of sulphate of ammonia percentage of total liquor distilled, the various methods employed in dealing with the sulphuretted hydrogen evolved in the manufacture of sulphate of ammonia from gas liquor, and the proportion treated: Proportion of sulphuretted hydrogen treated by the respective methods of disposal—By oxide of iron, 99·7; by combustion, 0·3 per cent.

Eastern and South-Eastern Counties.

There were, states Mr. F. Napier Sutton, 194 works registered in his district; and a total of 274 processes were under supervision. Every registered work has been visited.

Reporting upon gas liquor and sulphate of ammonia works, Mr. Sutton says that 93 works are engaged in the treatment and distillation of gas liquor for the manufacture of various ammoniacal compounds. These include sulphate, carbonate, chloride, and nitrate of ammonia, liquid (concentrated and refined) and anhydrous ammonia. The total quantity of ammonia produced in the district shows a decrease of 3150 tons (in terms of sulphate), as compared with the previous year. The gas companies produced 91·4 per cent. of the products, the balance being made in the works of private firms.

The methods used at the various works for dealing with the sulphuretted hydrogen evolved in the distillation process and the proportion of gas so treated, in terms of sulphate, and per cent. of total liquor distilled, is as follows:—

To vitriol chambers	66·9
By Claus process	12·6
By oxide purification	14·5
By neutralization after combustion	5·2
By coal gas purifiers ("direct recovery")	0·2
By combustion *per se*	0·6
Proportion of liquor distilled by the continuous process	99·1

It is thus seen, he remarks, that by far the largest proportion of sulphuretted hydrogen is utilized direct for the manufacture of sulphuric acid, which is used again for sulphate of ammonia manufacture. Oxide purification, however, is in use at the large majority of works, which number 61. Treatment by the oxide-heap system finds increasing favour, and is extending to works of large size. Where properly carried out, the system has many advantages over the box purifier system; and where dissatisfaction has been expressed, it is generally found to be due to faulty gas distribution within the oxide mass. In very wet seasons, overhead protection is necessary, and best takes the form of a span-roof on uprights, affording protection from excessive rain, but allowing free circulation of air. The cost of treatment by this method has been carefully kept during six years at a works producing 1000 tons of salt per annum, and has averaged 6·18d. per ton of sulphate made for the whole period, and 4·5d. for the last year. The Claus sulphur recovery process is used at seven works. Bauxite has been substituted for iron oxide as the catalytic agent at one works, and has given distinctly improved results. The sheet-lead sulphur depositing chamber used for over six years remains in excellent condition; and it is a matter of some surprise that the advantage of this form of chamber has not been generally recognized. The combustion-neutralization method of treatment is employed at ten works; but at one of these the method has quite recently been discarded for oxide-heap treatment.

There has been a very marked decrease in the yields of ammonia at two works where vertical carbonizing retorts have been installed, and also at a third where regenerative settings have replaced an older type of retort plant. The cause would appear to be the higher heat of the gas leaving the settings, and insufficient cooling of it before reaching the washing plant. Strong exception had to be taken to the continued use of a completely worn-out and obsolete distillation plant of intermittent type, which had been a source of anxiety for some time. The plant has now been demolished, and is being replaced by a modern distillation plant with oxide-heap purifiers. In all other cases the condition of plant and conduct of operations has given satisfaction, and no nuisance or complaint has to be recorded.

The number of tar dehydration and distillation works has increased to 24, by the registration of two new plants. One of these is for the dehydration of water-gas tar; and the plant has been most admirably designed. A considerable amount of naphtha comes away with the water, and is subsequently redistilled.

Seven Wilton's "coil" dehydrating plants are now in use in the district. Attention has had to be called to the necessity for some relief from internal pressure other than that afforded by the foul-gas pipe to the purifier, or other pipes controlled by cocks, where receiver lids are fastened down. At certain works employing this type of plant, large quantities of naphthalene distil over and separate from the "light oils" on cooling. This points to excessive heating of the tar in the coil. Where this has been reduced, the trouble has ceased; and yet the tar has been effectually freed from water. Again, in many cases all the lightest spirit (naphtha) is lost through insufficient cooling of the condenser-worm, and subsequent undue exposure of the distillates.

At all the large distillation works the tar is preheated and freed from extraneous water before passing to the stills for final fractional distillation—thus saving much time and fuel. This preliminary heating is done by utilizing waste heat from boiler-flue gases, condensers, &c.; but successful use has recently been made at one works of the high heat of the outgoing pitch, which passes continuously through a large cooler containing the heating coil. The heat interchange is thus mutually useful. Appliances and methods for the treatment of the permanent noxious gases from the still-worms are in all cases satisfactory.

Report to the Secretary for Scotland.

In his report on the work done in Scotland during 1914, the Chief Inspector (Mr. W. S. Curphey) states that the production of sulphate of ammonia was decidedly less than in 1913. This was due to the marked reduction in recovery from blast-furnace gases in the iron-smelting industry. The comparative figures are:

	Variation from 1913.
Gas-works	736 tons increase.
Iron-works	3851 ,, decrease.
Shale-works	312 ,, ,,
Producer-gas, &c., works	39 ,, increase.

The large decrease in iron-works production is equivalent to 20·7 per cent. of the production in 1913. It more than neutralizes the increased production of 2693 tons reported for that year. The negligible increase of 39 tons recorded for producer-gas, &c., works is not attributable to any increase in utilization of coal in the various works of this group, but coincides with the commencement of recovery of ammonia and other bye-products from peat. The utilization of this raw material is receiving attention in different countries; and a wide field is, Mr. Curphey urges, open to a process yielding commercially successful results. The increased production from gas-works liquor is worthy of note, when the conditions of external urban illumination consequent upon the war are remembered. The gas industry in Scotland, if measured by its sulphate of ammonia production, would appear to be in a vigorous condition. As yet little progress has been made as regards the adoption of the direct process in the treatment of gas liquor.

The report of Mr. J. W. Young, the District Inspector (which is included in Mr. Curphey's report), shows that the number of registered works was 170, at which 301 scheduled processes were in operation. The liquor distilled from gas-works was equivalent to 22,362 tons; and the noxious gases evolved were destroyed as follows: In oxide of iron purifiers, 68 per cent.; by combustion, 20; by the Claus process, 11; precipitated by metallic salts, 1. The average acidity of chimneys at these works was 0·60 grain; from coke-ovens, 0·48 grain.

The injurious effects produced on oxide of iron purifiers by excessive steam to the still, and by imperfect cooling of the foul gases leaving the saturators, have again been noted. Last year's report cited the dangerous use of galvanized iron pails in connection with the cleaning of saturators. Nevertheless, at one works no heed was given to the warning, and an attendant perished. It is possible, says Mr. Young, that the metallic pail and the death had not the relation of cause and effect; but the risk was taken unnecessarily.

A death during the cleansing of a tar-still is recorded. There was properly fitted the short safety length of pipe destined to be removed before entrance, and there were also suitable valves designed to be closed. Yet men were allowed to enter with the valves open, and before the safety-pipe had been cut out. One was overpowered by the fumes of pitch from an adjoining still. While gladly mentioning the courageous attempts at rescue, Mr. Young's comment is that "forethought would have been better."

STOCKTON-ON-TEES GAS-WORKS MANAGEMENT.

Resignation of Mr. William Ford.

At a Special Meeting of the Stockton-on-Tees Corporation Gas Committee on the 25th ult., the Chairman (Alderman Harrison) reported that he had received a letter from Mr. William Ford, tendering his resignation as Manager.

In this letter, Mr. Ford, referring to an interview at which he was informed that the Gas Committee desired to revert to the system of management in vogue at the works prior to the appointment of an Assistant-Manager, said that, though he was quite capable of managing the works on these lines, he felt, after 46 years' arduous and faithful service, that he had earned a rest. He therefore tendered his resignation as Manager, but expressed the hope that some arrangement might be come to whereby his services could be retained in some form or other in connection with the undertaking whose interests he had served for such a long period.

The Committee resolved that the resignation be accepted with regret, but that Mr. Ford be requested to continue in office until his successor takes up his duties; that the Council be recommended to express, in the form of an address, their thanks to Mr. Ford for his long and faithful services; that advertisements be issued for a successor at a salary of £500 per annum, rising to a maximum of £700; and that the Council be recommended to appoint Mr. Ford, on his relinquishing the management of the works, to the office of Consulting Engineer, at a salary of £250 a year.

Referring to the matter, the "North-Eastern Daily Gazette" of last Tuesday said: "The resignation, through advancing years, of Mr. William Ford from the position of Gas Manager of Stockton has been contemplated so long that it does not come as a surprise. To have served one Corporation for 46 years is a record which belongs to few officials; and in that time Mr. Ford has rendered most faithful and valuable services. During his long connection with these works, they have contributed annually large sums in profits to the relief of the rates; and though Mr. Ford will soon cease to manage the concern, it

is proposed that he should be retained by the Town Council as Consulting Engineer. The question of a successor to Mr. Ford is not yet being considered; but it is well known that the Corporation are in the fortunate position of having, in Mr. Matt. Dunn (in the position of Assistant Manager, which he has held for over twelve years), one who stands foremost in the gas world from knowledge and experience in the manufacture of gas and its bye-products."

The recommendations of the Committee were considered by the Corporation at their monthly meeting last Friday; and after discussion it was agreed to appoint Mr. Dunn as Manager.

Alderman HARRISON (the Chairman of the Gas Committee), in moving the adoption of the proposals set out above, referred at length to the services of Mr. Ford, and mentioned that 46 years ago, when he commenced his duties as Manager, they had 3000 consumers, and the annual make of gas was 54,000,000 cubic feet. Now they had 17,478 consumers, and the make was 429 000,000 cubic feet. Mr. Ford was a Gas Manager of the greatest eminence; and during his lifetime his services had been requisitioned in different parts of the country as an expert in gas manufacture. He hoped the Council would be unanimous in retaining him as Consulting Engineer.

Mr. B. WATSON, in seconding, also referred in eulogistic terms to the faithful services of the veteran Manager.

Mr. DOWNEY moved that the recommendation with regard to advertising for a successor be deleted, and that in its place it be decided that Mr. Matt Dunn, the Assistant-Manager, be appointed at a salary of £450, for twelve months, at the end of which time the position be revised. In Mr. Dunn, he said, they had a man who had served 12½ years in the position of Assistant-Manager; and in this time the Committee had had an opportunity of judging whether or not he was qualified for the position. They must in this matter consider the future of a man like Mr. Dunn, and they could not do as the Gas Committee suggested without damaging his future. If they did advertise, they could not get a manager with better paper qualifications than had Mr. Dunn. ["Hear, hear."] He considered that it was the duty of the Committee to have given the Council an opportunity of discussing whether or not Mr Dunn should receive the appointment, and it was with this object that he moved his amendment.

Mr. NATRASS seconding, said the amendment was a proposal of fair-play to a skilled servant.

Mr. DENNISON said, as one who had taken some part in the question which had led to the present position, he would like to explain that the Gas Committee were not prejudiced against Mr. Dunn; but they decided to advertise, feeling that if they proposed to put Mr. Dunn straight away into the post of Manager the Council might not accept it. Not a single member of the Gas Committee had any doubt about Mr. Dunn's qualifications.

Mr. WATSON said that in view of their having recently filled the position of Borough Engineer by advertising and not promoting the Assistant-Engineer they were obliged in the present case to advertise for the best man, whether it was Mr. Dunn or anyone else.

Mr. BOWMAN, speaking as one who had worked at the gas-works, said they had in Mr. Dunn a Manager quite as well qualified as was Mr. Ford.

Alderman HARRISON said he was pleased that Councillor Dennison had explained the position of the Gas Committee, because, though he, as Chairman, moved the confirmation of the minutes, he was certainly going to support the amendment. Several members of the Committee to whom he had spoken were strongly in favour of appointing Mr. Dunn directly to the post of Manager; but they were afraid that to do so might prejudice his chances for the office. Mr. Dunn was a man of excellent abilities; and it would have to be an exceptionally brilliant man to get his vote against Mr. Dunn.

Mr. COHEN said they were gratified to have such an expression of opinion from the Chairman of the Gas Committee.

After further discussion, Mr. Downey's amendment was carried by 22 votes to 12.

An amendment to fix Mr. Ford's retaining salary at £150 was defeated; and the Committee's recommendations respecting Mr. Ford were carried.

Dearer Gas at Lymm.—The Lymm District Council at their last meeting approved a recommendation of the Gas Committee that the price of gas be increased as follows: Ordinary consumers for lighting, from 3s. to 3s. 6d. per 1000 cubic feet; cookers, fires, &c., from 2s. 8d. to 3s. 2d.; and that no discount be allowed to prepayment meter consumers—the increases to take effect from the June meter readings.

Economy of the Use of Gas.—The Bradford Corporation Gas Department have taken advantage of the Government's call upon the nation for economy by circularizing the citizens, drawing their attention to the economy of the use of gas. The following passage occurs in the circular: "The public are reminded also that the use of coal for heating and cooking is wasteful—wasteful both in a domestic and in a national sense. Very important products are extracted from coal during the process of gas manufacture which are used to make the most powerful explosives required by the Army and Navy. By the continuance and extension of the use of gas the public are indirectly preserving and increasing the supply of these valuable explosives. Consequently there are more reasons than ever why householders should employ gas rather than coal for cooking and heating."

Street Lighting Charges at Brownhills.—The Brownhills Urban District Council have been considering tenders for street lighting for the ensuing season. It appeared that, owing to the war and consequent increase in the cost of coal and other materials and wages, the Ogley Hay and Brownhills Gas Company asked for an increase of 6s. 10d. for each lamp, the tender being £2 19s., against £2 12s. 2d. The Cannock, Hednesford, and District Gas Company asked for an increase of 6s. per lamp; the price being £2 4s., against £1 18s. For the part of the district lighted by the Walsall Corporation it was stated that the Council had a three years' agreement. Some members thought the increased charges unreasonable, and said that rather than pay so much they would do without street lighting altogether. It was resolved that the Clerk should write to the Companies to ask them to revise their terms.

PLYMOUTH AND STONEHOUSE GAS COMPANY.

High Freights and the Cost of Coal and Oil.

There was a large attendance of shareholders at the annual meeting of the Plymouth and Stonehouse Gaslight and Coke Company, which was held on Tuesday last—Sir JOSEPH A. BELLAMY (the Chairman) presiding.

In their report, the Directors stated that they considered the results of the past year satisfactory when it was remembered how exceptional had been the coal difficulties arising out of the war. In order to meet the heavy increased costs in connection with coal deliveries, and to provide the contribution to the Company's men who joined the forces, as well as pay the employees' war allowance, it was found necessary to advance the price of gas from 1s. 9d. to 2s. per 1000 cubic feet as from September last. It was anticipated that the high prices ruling in the coal and oil markets for new contracts would necessitate a still further advance in the price of gas in the autumn. The Directors reported, with much gratification, that no fewer than 63 of the Company's employees had joined the forces. The demand for gas was still increasing, and its use, apart from lighting, was rapidly becoming general where convenience and economy in heating were a consideration. A considerable increase in the output of gas had been occasioned by the demand at the forts and hutments at Crownhill. The revenue account for the year showed that the receipts totalled £149,468, as compared with £144,906 last year. From sales of gas the amount received was £114,996, as against £103,509; and meter and stove rentals yielded £8685, compared with £8547. Residuals, however, were down from £31,181 to £24,405. On the expenditure side were: Cost of manufacture £97,525, compared with £101,001 last year; distribution £10,160, as against £7786; rents, rates, and taxes, £4309, as against £4686; and management £6527, as compared with £6182. A new item was "active service" pay, £821. The total expenditure (£121,175) was almost exactly the same as last year (£121,125); but the balance carried to profit and loss account (£28,2,2) was £4511 more. The quantity of coal carbonized during the year was 64,927 tons, and the oil used 1,622,581 gallons. The coke produced was 38,866 tons and breeze 8318 tons, of which 13,195 tons of coke and 5463 tons of breeze were used on the works; the remainder being sold. Of tar, 788,021 gallons were made, and of sulphate of ammonia 592 tons.

COAL AND TRANSPORT DIFFICULTIES.

The CHAIRMAN moved the adoption of the report and balance sheet, which he said were very satisfactory in the circumstances. War had brought about adverse conditions which had to be faced, and the only thing the Directors could do was to limit as far as possible the expenditure in all directions. A serious crisis was caused by the Government, in the interest of the State, commandeering steamers, with the result that an insufficient number of vessels was left to carry coal. Up to that time the Company had relied entirely on seaborne coal. It had been best for them to work with steamers instead of railways, both in regard to cost of carriage and facilities for getting supplies regularly. Like many other gas companies receiving coal by sea, they were caught in an unfortunate position; for although they had a contract with a very large and capable firm of shipowners, so many ships had been taken over by the Government that the firm were quite unable to supply the tonnage necessary to bring their coal to Plymouth. The Directors did not accept at the time the position taken up by the shipowners. Their contract was worded in a way rather advantageous to the Company, and they claimed that the shipowners should charter other steamers, whatever the price might be, and send along the coal. However, it was impossible to get all the coal they required by sea. So they had to try to get supplies by rail from Wales and Yorkshire, where they did not usually buy coal for gas making. It was not a success. They had to pay very high prices, and the railways could not deliver in anything like a reasonable time; but they had to obtain some hundreds of tons in this way to keep the works going and the town supplied with gas. Since this crisis passed they had met with very considerate treatment from the steamship owners with whom they had the contract; while the Directors, on their part, recognizing that the conditions were abnormal, had not demanded all that they might possibly have obtained by litigation. The Directors made some concessions in regard to war risks insurance and in other ways; and the shipowners fully appreciated their action. So they had arrived at their present position without litigation, and they had got their coal for the time being. Other difficulties had been caused by various restrictions placed upon their business to meet Government requirements—the commandeering of their steam-waggons and in other ways. They had met these difficulties loyally, recognizing that the Government had to carry on the business of the country, and that the interests of the Company must come second.

INCREASED PRODUCTION AND SALES.

During the year they had had to increase the price of gas to a small extent, and they had hoped this would be sufficient; but at a later date a further advance would become imperative. One reason why the balance-sheet was not so good as it might have been was that they had realized a good deal less by the sale of coke. Still, the position of the Company was perfectly satisfactory in the circumstances. In the past, by careful working and the judicious expenditure of capital, they had managed to modernize things, and so placed themselves in a better position than they occupied some years ago for dealing with adverse circumstances as they came. The consumption of gas had increased in the past three years by 132 million cubic feet; the total consumption for 1912 being 1,096,835,000 cubic feet, and this year 1,229,736,000 cubic feet. When it was remembered that they had a very strong competitor in electric lighting, they had reason to be proud of these figures. The number of private consumers, apart from slot consumers, which in 1912 was 16,830, had increased by 832; and the slot consumers, who in 1912 numbered 15,204, had increased by 3365. This showed that the Company treated their customers well. There had been an increase in the three years of 1965 in the number of cookers, and of 805 in the gas-fires on hire, and they had also 512 hot-water

circulators installed. By good management and skill on the part of the Engineer and his staff, they had increased the make of gas per ton of coal carbonized from 11,790 cubic feet in 1913 to 12,328 cubic feet —an increase of practically 5 per cent. A few years ago they put up machinery for storing and dealing with coke in an economical way, and this had proved very advantageous. It saved labour; and as the entire stock of coke was kept under cover, purchasers obtained it dry, and had not to pay for perhaps 20 per cent. of water which was absorbed when the coke was stacked in the open.

Coal and Oil Contracts.

With regard to the future, the Company stood upon a sound foundation, and the business would continue to prosper. The set-back brought about by the war was only of a temporary character. A short time ago difficulty was caused by the announcement of the coalowners that they would not be able to maintain supplies of coal owing to the number of miners who had enlisted. This brought about a serious state of things. Gas companies who sought to make contracts found that prices had jumped up 100 per cent. in excess of last year's figures. In these circumstances, the gas and electricity companies joined in representations to the Government; and he was appointed a member of an influential Committee who held sittings in London. The position had now improved considerably. Instead of the collieries stating that they could not supply coal at all, or that they could supply only 50 or 70 per cent. of the quantity previously supplied, they had arrived at the position that coal could now be bought. Prices weakened, though not to a very considerable extent; and the Company had made their contracts for the next twelve months at a price with which they were very well satisfied. In regard to the supply of oil, in placing their contract they had to pay 100 per cent. more than last year. It was fair to say that this arose not from an increase in the price of oil at the port of shipment, but from the scarcity of tank-steamers and the consequent increase in freights. Last year's freights from Atlantic ports were about 18s. per ton; while this year they were 60s. These advances would necessitate an increase in the price of gas, and a consequent reduction of the dividend.

The Co-Partnership Scheme.

Sixty-two men from the Company's works had joined the Colours; and they had had to say that they dared not let others go if they were to maintain the supply of gas. The men were loyal and worked well; but it had to be recognized that ten men could not do the work of twenty. Mr. Hoyte, their Engineer, had accepted, with the consent of the Directors, a position under the Munitions Committee. In regard to the co-partnership scheme, they started with a standard price of 2s. per 1000 cubic feet, and when the scheme originated and gas was 1s. 7d. per 1000 cubic feet, the men had a bonus of 5 per cent. Last year, with gas at 1s. 9d., they had 3 per cent. But gas was now 2s., and the Directors had been considering what should be done. With the consent of the shareholders, they proposed to take a generous course. They declined to take up the position that because war had broken out the co-partners should not have anything, and it was decided that they should have a sum which would work out proportionally at 3 per cent. on their wages. The men had worked well, and backed the Company up in every way they could. The Directors had also been giving gratuities to the officers and men of the ships which brought their coal. It had been his ambition to keep the price of gas at Plymouth lower than the price at Newcastle, where their coal came from. To-day the price at Newcastle was 2s. 1d., and at Plymouth 2s. How long they would be able to maintain this record, he did not know; but they had done it for many years, and he hoped it would continue. In conclusion, the Chairman referred specially to the services rendered by the heads of departments.

The report and balance-sheet were adopted, and a special resolution was passed for the payment of the sum (£881 11s. 2d.) required for the co-partnership scheme. Dividends were authorized at the rate of 5¾ per cent. on the ordinary stock and of proportionate amounts on other classes of shares.

Mr. H. R. Lavers, on behalf of the workpeople, thanked the Directors and shareholders for the concession made to the co-partners.

MALTA AND MEDITERRANEAN GAS COMPANY.

The Usual Dividends Declared.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, Nos. 59-60, Gracechurch Street, E.C.—Colonel James Legeyt Daniell in the chair.

The Secretary (Mr. C. J. Daun) read the notice convening the meeting and the certificate of the Auditors; and the report of the Directors and the statement of accounts were taken as read.

The Chairman, on rising, said he would be failing in his duty if he did not first of all make some allusion to the death of the late Auditors —Mr. R. Hesketh Jones and Mr. Thomas Guyatt—which, strange to say, occurred within a fortnight of each other. The Directors had no hesitation in offering the auditorships to Mr. Ernest L. Burton and Mr. William Cash, who had been through the accounts on the present occasion, and would now submit themselves for re-election. Colonel Clarke was sorry not to be able to be present at the meeting, but being this year High Sheriff for the County of Sussex, he had to attend on the Judge of Assize. In moving the adoption of the report and balance-sheet, he said he had to express the regret of the Directors at having found it necessary to keep the shareholders waiting a little while for the accounts; but he felt sure they would understand that the war had put everything out of gear, and that the meeting had been called at the earliest possible moment. Now that the proprietors had the accounts before them, the Board trusted that they would not be disappointed. It would be observed that the accounts were very much the same as those for preceding years. Taking the profit and loss account first, it would be found that the cost of coal, &c., and the sale of gas were practically the same. There had been a falling off, under the heading of residuals, of some £1630. The General Manager reported that, in addition to the fact of the war interfering with the export of coke, the prices at Malta and elsewhere were not so good as in the preceding year. Really the only other point on the debit side of the account was the depreciation of investments by £696. In the previous year, they had to write them up slightly; but on this year's valuation, they had fallen by the amount named, which was not surprising. In the general balance-sheet, on the credit side stocks at stations figured at more, and sundry debtors at less, than last year. They were items which, of course, varied according to circumstances —this time in the right direction. On the debit side, the amortization had increased by the amount of interest accruing on its investment. The debenture debt stood at £8000; and he could remember the time when it was £45,000. The average make of gas per ton of coal carbonized at all stations was 12,361 cubic feet. Credit was due to the management abroad for the way in which they had endeavoured to control the expenditure at the different stations. In fact, he could not resume his seat without bearing testimony to the manner in which the staff had worked, and brought about the results which the shareholders had before them. They always received the suggestions and instructions of the Board in the right spirit, and took pride and pleasure in giving effect to them. The proprietors would be glad also to hear from him that the appointment of Mr. Daun as their Secretary had been a great success. There was one matter of a somewhat personal character which he wished to mention. The Company had been in the habit of paying the Directors their fees in full. The Directors would like to be indemnified with regard to the past; and the Auditors would be glad to have authority for their guidance in future. This could only be effected by a special resolution; and the Board did not propose to do it at the present moment. Probably they would look carefully through the Articles, to see if anything else suggested itself for alteration, and would then call the shareholders together to carry the matter through.

Mr. A. M. Paddon formally seconded the resolution, which was agreed to without discussion.

On the proposition of the Chairman, seconded by Mr. A. F. Phillips, dividends were declared at the rate of 7 per cent. on the first preference shares, 7½ per cent. on the second preference shares, and 6 per cent. on the ordinary shares (the last named free of income-tax) for the year ended March 31—deducting the payments made on account.

Proposed by the Chairman, and seconded by Mr. E. L. Burton, the retiring Director (Colonel Stephenson R. Clarke, C.B.) was re-elected.

Mr. Joseph Cash, in moving the re-election of the Auditors (Mr. E. L. Burton and Mr. William Cash), said he regretted very much the loss of the two Auditors who had served the Company for so long. Mr. Hesketh Jones he had known for perhaps forty years, and Mr. Guyatt for twenty. These two Auditors could not possibly have been replaced by better men than had been appointed, and now sought re-election.

Mr. F. R. Smith seconded the resolution, which was unanimously passed.

The Chairman said it afforded him much pleasure to propose a hearty vote of thanks to the staff, for the excellent manner in which they had, one and all, conducted their duties. He mentioned by name the Secretary, the General Manager (Mr. Starkey), the Chief Engineer (Mr. Reid), and the two Managers at Trapani and Marsala.

Mr. F. W. Cross said that, as an old gas manager who had served abroad, he knew the difficulties of such a position, and therefore he had particular pleasure in seconding the resolution.

The proposition was cordially agreed to, and suitably acknowledged by Mr. Daun.

The proceedings concluded with a similar compliment to the Chairman and Directors, on the motion of Mr. Joseph Cash, who remarked that, while the past year had been one of the most difficult experienced, the next one would probably be even more so. The accounts of the Company were certainly very satisfactory, taking into consideration all the circumstances of the case. The shareholders could not do less than tender to the Board their heartiest thanks.

Mr. Westbrook seconded the motion, which was acknowledged by the Chairman.

HARWICH GAS COMPANY'S NEW PREMISES.

The Harwich Gas Company are now installed in new, commodious, and altogether desirable premises. They have removed their offices and store from Harwich to Dovercourt, where they not only boast of up-to-date offices and equipment, but also of a spacious show-room, replete with all the latest appliances to be found in such a building. The new premises are situated in the High Street in the most central and busy part of the borough. The buildings are of red stone and brick, enriched with carving in the classic renaissance style. Entering the premises from the High Street, one passes through a corner entrance-lobby to the show-room and inquiry office, which is 31 feet by 26 feet. The office portion of the show-room is replete with the latest furniture and fittings; and the show-room itself is well stocked with the latest and most modern stoves, radiators, grillers, and other appliances, of the best makers on the market. One of the exhibits is a Wilson fire, surmounted by an oak mantelpiece, with the recess lined with French tiles. At the rear of the show-room is a lobby opening into the Secretary's office, with a reinforced concrete strong room, and lavatories adjoining. Mr. George Baines (the Secretary and General Manager) is an old and valued servant. For the long period of 34 years he has been associated with the Company, and has watched its growth and development; and for the last 21 years he has held his present position.

A bold teak staircase leads to the board-room on the first floor. On the same floor, the Works Manager (Mr. W. E. Jolliffe) has a well-equipped office.

At the rear, on the ground floor, is a large unloading-yard, with lofty workshops and stores. The whole premises may be said to be admirably suited to the work of the Company.

CO-PARTNERSHIP IN WAR TIME.

The following remarks on the subject of "Co-Partnership in War Time," by Mr. Charles Carpenter, D.Sc., appear in the July number of the "South Metropolitan Gas Company's Co-Partnership Journal."

No partnership is possible, whether in business or anything else, unless provision is made for the sharing of trouble as well as prosperity, of losses as well as gains. For the second time in the history of our co-partnership (now 26 years old), the bonus has fallen to a considerably lower figure than has been customary. It is regulated, as is well known, by the price at which gas can be sold; and at the present figure it amounts to 2¼ per cent. A critic quite recently exclaimed against our system of partnership that it had now been proved a failure, inasmuch as the bonus had gone down through causes for which the participators were in no way to blame, though they suffered by the results. Of course, they do, conjointly with the consumers of gas and the shareholders in the undertaking, who are also out of pocket as the result of happenings equally beyond their control. It is, at any rate, something to take pride in that at a time when the nation is fighting for its very existence, not only are the profits of the undertaking reduced, but those three classes of partners who together enjoyed more prosperous times are now sharing the heavy burden thrown by the present strain upon their resources. I can, indeed, imagine that some of the coal producers are just a little ashamed of the exorbitant prices we have had to pay for our raw material.

In accordance with the notice issued early in the war, the bonus will be credited to all regular men working under agreements, as well as to those of military age who, so that they might feel unfettered in any desire to join His Majesty's forces, have not been allowed to sign-on. The average bonus payable in respect of the last twelve months' service of staff and workmen works out at 6 per cent. on salaries and wages; since only during the latter three months of the time has the price of gas been at its present high figure. There is worse, however, to come; for nothing can prevent the bonus for the year just commencing being below that just declared.

Too great heed, therefore, cannot be given to the advice of the Government that the most careful economy should be practised by everyone. When all was seemingly going well with us as a nation, we were paying for the necessaries we imported by merchandize we manufactured and exported. We are far now from being in this happy position. In order to live, we must go on with the import of necessaries. But instead of exporting manufactures, we now have to send out of the country our needed gold to pay for them. We shall all be "doing our bit" for our country better if we realize this, and give effect to that knowledge by helping to husband her strength while we give her unrestrictedly the fullest measure of our own effort. At no time in our history as a nation has that effort been more needed.

There is not room for all of us in the trenches or on the battleships. There is plenty of scope for those left behind to work unceasingly in the task of providing the requirements in munitions and equipment of those bearing the heat and toil of the fight on the seas or in a foreign land. Fortunately, the part played by gas undertakings in a crisis such as the land is passing through is being recognized more and more each day. When I think of the enormous amount of time and energy so many of our staff are putting into what may be well called "first aid" for the country, I cannot help feeling how great is the debt to co-partnership, which has taught all its participators to look at things from a wider standpoint than would be possible in the case of the ordinary workman or his leaders. Let us hope their efforts may be crowned with success before the declaration of another bonus.

ROYAL SOCIETY OF ARTS.

The Council's Report for the Past Year.

At the 161st Annual General Meeting of the Society held on Wednesday last, the report of the Council for the past twelve months was submitted, in the course of which it was announced that the Society's Silver Medals for papers read during the session 1914-15 had been awarded to (among others) Mr. H. M. Thornton for his paper on "The Industrial Uses of Coal Gas," to Mr. Charles Darling for his paper on "Recent Progress in Pyrometry," and to Sir William A. Tilden for his paper on "The Supply of Chemicals to Britain and her Dependencies."

In the course of their very extensive report the Council make the following remarks:

The first two papers after the opening address dealt with the question of industrial supplies to which attention was first devoted after the breaking out of the war—namely, the supply of chemicals. It has been for long a matter of common knowledge that almost the whole of the chemical reagents employed in industries in this country came from Germany. A typical instance of this is the supply of dye materials The story has been told over and over again how the infant industry of the development of coal-tar colours originated in England, and, after being carried on to a considerable point of success, was transplanted to Germany, and there, by a combination of skilfully applied capital and wisely directed chemical research, developed into by far the greatest scientific industry which the world has ever known. The natural result was that the manufacture of coal-tar dyes, with all the innumerable products associated with their manufacture, came to an absolute cessation in England, which has been allowed to rely wholly upon Germany for all the chemical products required. The subject was very ably dealt with in two papers—one by Sir W. Tilden and the other by Dr. W. R. Ormandy.

In his paper on "The Industrial Uses of Coal Gas," Mr. H. M. Thornton gave an exhaustive account of the numerous applications of gas to purely manufacturing purposes. It must have been more or less a revelation to all who are not specially cognizant of the developments of gas manufacture to know in how very many cases gas has taken the place of solid fuel for industrial purposes. This application of gas is of comparatively recent introduction; and the Chairman of the meeting mentioned the fact that when Sir Corbet Woodall took the chair at a meeting of the Society thirty-five years ago, he stated that at that time not more than 5 per cent. of the gas used was employed for purposes other than lighting. At present about 40 per cent. is so used: and yet it was the opinion of those best qualified to speak on the matter that this only marked the beginning of the era of the industrial application of gas.

Dr. Augustus Vernon Harcourt's contribution was mainly intended to describe a simple instrument he had constructed for the measurement of radiant heat from domestic fires, and a grate he had himself devised for the economical combustion of coke. It, however, contained also a good deal of information on the subject generally. An interesting side-issue was his demonstration of the futility of expecting to increase the amount of heat generated from coal by the use of any nostrums applied to the fuel during combustion.

Mr. Charles Darling, in his paper on "Recent Progress in Pyrometry," may be said to have completed the information provided in his Cantor Lectures of 1911, by bringing the matter down to date; and he certainly showed that there had been very considerable progress made in pyrometry since the admirable course of lectures referred to.

It must be admitted that in his paper on "The Industrial Uses of Radium," Mr. Thorne Baker rather dealt with the future than with actual achieved results. He, however, gave a very interesting account of the experiments which had been made to test the effects of applying solutions of radium salts to aid vegetation growth, and held out considerable prospect that these experiments justified the expectation of valuable results in the immediate future.

The course of three lectures on the subject of "Motor Fuels" given last session under the Fothergill Trust by Professor Vivian B. Lewes was very appropriate to the present time, when the use of petrol as a fuel on land, on the water, and in the air has become so important for warlike purposes.

The Albert Medal of the Society for the current year has been awarded to Professor Sir Joseph John Thomson, O.M., D.Sc., LL.D., F.R.S., for his "Researches in Physics and Chemistry, and their Application to the Advancement of Arts, Manufactures, and Commerce."

SUSPENSION OF SINKING-FUNDS.

Position of Gas Undertakings.

The question of the suspension during the war of sinking funds in connection with municipal gas undertakings was raised at a meeting last week of the Annual Committee of the Convention of Royal Burghs, in Edinburgh.

Mr. Alexander Morrison (Bridge of Allan) remarked that they were being called upon every day to exercise economy; and this economy, he held, could be exercised as much in the consumption of gas as anything else. The increased price of coal had increased the price of gas. One way in which this might be neutralized was by dealing with the sinking funds. He moved that the Convention approach the Scottish Office to have the sinking-fund provision of the Gas Supply Act, and the corresponding provision of other Acts under which the undertakings were administered, suspended during the operations of the war.

It was, however, moved and seconded that the whole question of sinking funds during the war be remitted to a Committee for consideration and report; and this amendment was carried.

Subsequently the following letter on the subject was addressed by "A. C. W." to the Editor of the "Scotsman."

It is to be hoped that the very sensible suggestion made at the meeting of the Annual Committee of the Convention of Royal Burghs by the Town Clerk of the Bridge of Allan—viz., that, during the war, local authorities be empowered to suspend their contributions to sinking funds—will materialize.

The proposal is particularly pertinent in respect of municipally-owned gas and electricity undertakings, which are likely to be severely hit by the abnormal advance in the cost of coal and other material, by war allowances and bonuses, and by economy of consumption on the part of the public. The capital expended in ventures of this kind is usually amply secured; and there seems to me to be no sound argument against a temporary cessation of these contributions, which, in many cases, would make increases in the price of gas or electricity unnecessary, and in others materially reduce the increases. In exceptional times, exceptional measures are justified. Of late years much has been done to stimulate the use of gas for cooking, heating, and manufacturing purposes; and it would be most unfortunate if greatly advanced rates for this commodity were to cause a serious set-back, and a consequent addition to the pollution of the atmosphere by smoke.

The Local Government Board have been approached from more than one quarter on this sinking-fund suspension question; but nothing appears to have resulted. Perhaps, under a Coalition Government, and in view of the alarming increases in the price of gas and electricity which are reported in the papers almost daily, common sense may yet prevail.

War Loan Contribution at Droitwich.—When introducing the annual report on the working of the Droitwich gas undertaking, as noticed in last week's "JOURNAL," the Chairman of the Lighting Committee (Alderman J. Gabb) said that, though so many authorities were raising the price of gas, they did not intend to do so at Droitwich. Consumers, when they came to consider the matter, would no doubt conclude that they had been served well. The Committee concurred in a suggestion of the Mayor that the £250 put to reserve should be invested in the new war loan—feeling, with him, that every encouragement should be given to the Government at this critical time.

OLDHAM GAS-WORKS RESULTS.

Annual Statement of Accounts.

The report of the General Manager (Mr. Arthur Andrew) to the Gas Committee on the working of the Oldham Corporation gas undertaking for the year ended March 25 states that the gross revenue on gas-works account amounts to £184,732, and the gross expenditure to £161,102; the balance carried to profit and loss account being £23,630. Annuities, interest, and sinking fund figure at £31,851, making the net loss on the year's working £8221, to which there is added the amount paid to the borough fund £7500, and depreciation on gas cooking stoves £1650, making a total deficiency for the year of £17,371. As the credit balance brought forward was £7262, there is a debit balance to be carried to the next accounts of £10,109.

The loss on the year's working of £8221 is caused principally by the great decrease in the amount received for residual products. A sum of £917 has also been paid as an allowance to those employees of the department who have joined His Majesty's forces. The net price realized per 1000 cubic feet of gas sold during the past year was 1s. 10·33d., as compared with 1s. 10·18d. in the year previous. The deficiency of £17,371 (which includes £7500, the amount the Corporation are entitled to appropriate in aid of rates) is equivalent to 2·790d. per 1000 cubic feet of gas sold. Until the beginning of February, coke was very difficult to dispose of, even at low prices; and the improvement which then occurred was not sufficient to make the average price equal to last year. The stock of coke in December reached the large figure of 14,000 tons. Tar has been markedly affected; and some of the products have been practically unsaleable—pitch particularly. In order to avoid the heavy loss which would have been unavoidable if pitch had been forced on the market at the low prices ruling after the outbreak of war, arrangements were made to purchase the pitch from the tar contractors, with the object of storing it until a better price is obtainable. The amount in the reserve fund on March 25, 1914, was £47,692; and interest has accrued to the fund to the amount of £1447. The sum of £8580 has been taken out of the fund and placed to the credit of capital account, which sum is the estimated value of discarded plant at the various works. The amount standing to the credit of the fund on March 25 last was £40,560, against which there is a balance of loss on the profit and loss account amounting to £10,109, which will reduce the amount available to £30,451.

The quantity of gas made was 1,636,436,000 cubic feet, against 1,673,870,000 cubic feet in the preceding year, being a decrease of 37,434,000 cubic feet, or 2·23 per cent. The following quantities of coal, oil, and benzol have been used in the production of gas: Coal, 122,372 tons; gas oil, 249,955 gallons; benzol, 26,265 gallons. The average quantity of coal gas made per ton of coal carbonized was 12,510 cubic feet, compared with 12,125 cubic feet in the previous year. The quantity of gas unaccounted for has been 116,669,200 cubic feet, or 7·13 per cent. of the make. The average calorific value of the gas supplied during the year was 573 B.Th.U.

The total number of meters fixed on March 25 last was 57,986—9009 of the prepayment type. Of the total, 580 meters have been fixed in new premises and others in which gas was not previously used, and 122 meters have been permanently disconnected. The actual number of consumers was 51,182. The net increase in the number of additional cooking stoves and grillers fixed during the year was 679. The total number in use on March 25 was 23,488, excluding stoves owned by consumers. The policy of supplying radiators and water-heaters in addition to gas-fires on simple hire terms has led to a very satisfactory demand for these appliances. The number of fires, &c., fixed on simple hire during the year was 1576. There has been an increase in the quantity of gas consumed in houses and shops of 31,719,600 cubic feet, and a decrease of 73,206,300 cubic feet in that used in mills and workshops. The number of prepayment meters in use increased during the year from 7322 to 9009; and the quantity of gas consumed through them increased from 80,152,900 to 98,314,900 cubic feet. The total number of lamps fixed in the supply area on March 25 was 6382.

An installation of vertical retorts at the central works has been completed, and new and enlarged purifiers have also been installed at the same works. The capacity of the plant at this station is now 1,000,000 cubic feet per 24 hours.

Considerable help has been rendered to the Red Cross Society and Belgian Refugees Committee by supplying gas at a low rate, and also fixing cookers and fires on special terms. Assistance has also been rendered gratuitously in the laying of mains, providing and fixing gas-fires, and street-lamps, &c., for lighting and heating purposes, at the Military Camp at Chadderton Park. On March 25 the number of men in the employ of the Gas and Water Departments who had joined His Majesty's forces was 78.

TIPTON GAS UNDERTAKING.

After further consideration of the question of the extension of the plant at the gas-works, and after hearing the report of the Manager (Mr. W. Prince) as to water-gas plant and the rebuilding of some of the old retorts, the Tipton Gas Committee inspected the works and decided to invite tenders for the building of four new horizontal beds in the old house. Two tenders were received; and it was decided to accept that of Messrs. Drakes Limited, on condition that they undertake to have the plant ready for making gas by Nov. 1 next.

The Manager has issued the annual balance-sheet. He congratulates the Committee upon the past year's working, and states that, considering the unprecedented state of the coal market and the depression in the residuals market, they have come through as favourably as most undertakings. In order to meet the additional cost of coal and other materials, and war bonuses and allowances, the sum of £3500 must be raised during the present financial year; and he recommends that the price of gas be further increased 3d. per 1000 cubic feet, to commence from the June quarter's reading of meters. The Committee and the Council have adopted the recommendation.

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OLDBURY GAS PRICES.

At a Meeting of the Oldbury District Council last Friday, the Gas Committee recommended that the royalties charged to consumers in the Birmingham area of supply be discontinued; also that the tender of Messrs. Humphreys and Glasgow for supplying an extension of the carburetted water-gas plant be accepted. They further recommended that the price of gas to ordinary consumers be increased 9d. per 1000 cubic feet, and that the charges to slot-consumers and users of gas for power purposes be increased 8d. per 1000 feet—the increases to take effect from and after the June reading of the meters.

In the course of a long discussion on the report, Mr. Jackson (Chairman of the Gas Committee) explained that they considered it necessary to extend the carburetted water-gas plant, in view of heavy demands expected later on. They had had before them the question of the erection of a vertical-retort house, and the matter was looked upon favourably by the Committee. But as such a scheme would entail a large outlay, it was postponed for the present. Mr. H. Robbins protested against the price charged to manufacturers for gas for power purposes, and asserted that they were selling gas to this particular class of consumer at less than cost price. The Chairman and Mr. J. W. Wilson, M.P., strongly denied this; and the latter gentleman suggested that they should call in an expert to satisfy the Council on the matter. Mr. Jackson referred to the results of last year's trading, and remarked that they received an additional revenue of £543. There was an increased expenditure of £2162, of which £2070 was due to the higher cost of manufacture and wages. There was a net loss of £1549; and he calculated that the reduction of 2d. per 1000 feet in the price of gas in 1912-13 had deprived the Gas Committee of revenue amounting to £3000. They would not have been faced with a deficit now, if this concession had not been made to the consumers. The total increased expenditure this year would be £3750.

An amendment moved by Mr. H. Robbins to refer the report back to the Committee was rejected; and the report was ultimately adopted.

CARBONIC ACID GAS IN THE ATMOSPHERE OF ROOMS.

Under the title of "Modern Views on Ventilation," last Saturday's issue of the "Lancet" publishes from a "Special Sanitary Commissioner" an article which sums up the matter in such a way as induces us to make the following extracts.

Now that so many private dwellings, the public rooms of hotels, assembly rooms, riding schools, school rooms, and all kinds of commodious buildings, not constructed to serve as hospitals, are nevertheless receiving the wounded soldiers as they arrive from the front, the difficult problem of ventilation has to be solved on a very large scale. This calls for all the more attention, as of late years good cause has arisen to show that principles which used to be generally accepted are no longer considered impeccable.

At the beginning of the year an important account of the most recent theories on the subject, and of some valuable experiments, appeared in the "Official Bulletin" of the International Office of Public Hygiene, having previously been published in the "Journal of the American Medical Association." The publication has now been in the hands of public health authorities of thirty-two governments for some little time; and as sanitary reformers in these various countries study the bulletins of the International Office, we may hope that modern teaching in regard to ventilation will become widely known. The care of the wounded renders this question of practical urgency at the present moment.

First, it is pointed out in the bulletin that even before the discovery of oxygen the respired breath was believed to contain a noxious principle; and subsequently the evil was attributed to carbonic acid gas. But at the beginning of the Nineteenth Century the presence of another poison in crowded and inefficiently ventilated rooms was suspected; and in 1851 Cavarret demonstrated that animals died when placed in an overcrowded enclosure, though the excess of carbonic acid was withdrawn and oxygen supplied. Brown-Séquard and d'Arsonval, after condensing the breath of men and dogs, and injecting this into animals, produced symptoms of poisoning. Du Bois-Reymond said this had an albuminous base, and called it "anthropotoxine." Thus the belief in the direct contamination of air by breathing grew—involving the necessity of the constant removal and renewal of air. Nevertheless, so far back as 1842 Leblanc demonstrated that, no matter how crowded a room might be, the proportion of oxygen rarely fell to less than 20 per cent.; and, on the other hand, Regnault and Reiset, only a few years later, showed that the proportion of oxygen could be reduced to 10 per cent. without increasing the rapidity of breathing. At the same time, these and other authorities also demonstrated that air containing far more carbonic acid gas than could possibly be found in the most crowded rooms might be breathed without causing any inconvenience. Pettenkofer later on (in 1862) also insisted that it did not matter if the proportion of oxygen in the air was decreased and that of carbonic acid increased. But though he denied that there was any harm in even a large proportion of carbonic acid, its presence might become a good danger signal, indicating that the atmosphere was likely to be infected. Many other authorities and experiments are mentioned in the bulletin, all alike indicating how the belief that expired breath contained an organic poison was gradually abandoned. In 1883 Hermans (of the Amsterdam Institute of Hygiene) attributed the discomfort and rising temperature from which people suffer when crowded together in an ill-ventilated place not to poisonous atmosphere, but merely to the material difficulty caused by want of space. His simple explanation was that persons in a crowd had not enough air around them to keep their bodies cool, the radiation from the skin of heat, and their evaporating perspiration, maintaining an excess of temperature and humidity.

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He contended that ventilation was a physical rather than a chemical problem.

Professor Haldane, of Oxford, conducted various experiments during 1905, in a specially constructed chamber, in certain tin mines and weaving mills. He insisted that it was the excess of dampness, rather than of heat, that was injurious. The same year, Flügge, Heymann, Paul, and Ercklentz made comparative investigations with sick and healthy subjects placed in a closed chamber. They did not suffer when exposed to an excess of carbonic acid gas or when deprived of the usual proportion of oxygen, nor from any volatile organic poison they might be supposed to expire from their lungs. But they did complain of the excess of heat, of humidity, and of the stillness of the air. For thirty years experiments had been suggesting that neither carbonic acid nor some mysterious poison generated by the process of breathing was the cause of the evils which ventilation is expected to remedy; and at length the general observer turned to the physical rather than the chemical condition of the air as the thing which affects the individual. It became recognized that we need movement and change in the air we breathe, just as we need exercise and variety in the food we eat. Dr. Leonard Hill has made some important investigations on these points. He has stated in our columns that the increased percentage of carbonic acid gas and diminution of oxygen which have been found to exist in badly-ventilated enclosures are such that they can have no effect upon the incidence of respiratory disease and the higher death-rate which statistical evidence has shown to exist among persons living in crowded and unventilated rooms. In his view, it is the conditions of temperature, moisture, and stagnant atmosphere in such places which reduce the whole metabolism of the body to a lower plane.

It used to be said that the air of an inhabited room should not contain more than 0·06 per cent. of carbonic acid. It is now demonstrated that when the carbonic acid does not amount to 1 per cent. it does no harm. Not more than 0·4 per cent. is found in the most overcrowded public halls. As for oxygen, we know that men can work and live vigorous healthy lives in the mountainous regions of the earth where the partial pressure of oxygen is only 17 per cent. of an atmosphere or less. Much too much attention has been devoted to the effect produced on the chemical composition of the atmosphere by breathing; whereas the trouble is caused by the exhalations, the dampness and the heat coming from the body, its effects on the clothes worn, and the temperature of the air surrounding the body. The proportion of carbonic acid, not important in itself, may also be noted as a witness of the quantity of fresh air supplied. If the result is not good, it is not reasonable to at once condemn the system employed, whether it be some method of mechanical ventilation or natural ventilation depending merely on the opening of windows. Both these systems may work well or badly according to the way they are applied. In a commercial establishment at New York, for example, where 4000 persons are employed, the building was too hot. There was no fault to find with the system of heating and ventilation, but in its application. The flue that should have carried away the heat from a warming apparatus to a ventilating shaft was not in working order.

METROPOLITAN WATER BOARD'S DEFICIENCY.

The vexed question of the Metropolitan Water Board's deficiency continues to excite discussion among the various Metropolitan Borough Councils.

The Islington Borough Council recently considered a communication from the Hackney Council expressing the opinion that the Board should obtain powers to make such charges over the whole of their area as would ensure that the Board's income would be sufficient to meet their expenditure, without the necessity of levying the deficiency rate. The Islington Council, however, felt that it was not desirable that the Board should be empowered to increase the existing charges for water, but rather that steps should be taken to ensure that any sum required to meet a deficiency in the accounts should be apportioned among all local authorities in the Board's area; and in this expression of opinion the Stepney Borough Council have concurred. The Westminster City Council, on the other hand, consider that the question of the revision of the apportionment of the charges for water supply requires very careful consideration, and do not think it desirable that they should commit themselves to an expression of opinion on the subject at the present time.

Following the abortive conference between the London County Council and Metropolitan Water Board on the same subject [which took place early in May] there appears, therefore, to be little prospect of any definite steps being taken in the matter before the termination of the war.

At the conference here referred to, the arguments for the County Council were put in the main by Mr. Laurence W. S. Rostron. The case for the County Council propounded, as an important matter of principle, that the question of the deficiency in the water fund should be placed upon a proper basis; and among other things it was suggested that the question, in fact, affected the popularity of the Board's stock as an investment and the security of the stockholders. It was urged that, even though the sums apportioned upon the local authorities in respect of individual deficiences might be relatively small, and each annual deficiency in itself of no large amount, yet in the whole these sums attained a considerable aggregate. The deficiencies are, it was urged, likely to go on and increase; and future capital commitments of the Board and the coming into operation in 1923 of the sinking fund on the purchase-money of the undertaking would materially add to the amount. It was also, among other things, pointed out that London had a grievance from the fact that some districts which take the Board's water do not contribute to the deficiency; and the grievance was not removed by the mere fact that if these exempted districts were brought into contribution the amounts apportioned upon them would in many cases be small. The Council further alleged that, in the extra-Metropolitan districts, the valuations of the local Assessments Committees, upon which the water-rates are all charged, are made upon a lower

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standard than prevails in London, and that this aggravates the London grievance.

Mr. C. G. Musgrave replied on behalf of the Water Board; and the delegates subsequent to the conference placed on record their considered opinion in the following terms: "That the conference with the London County Council on May 7, with respect to the methods of meeting the deficiency in the water fund, did not show that any circumstances had arisen which (*a*) were not contemplated at the time such methods were prescribed by Parliament, or (*b*) would justify the Board in promoting a Bill which could not fail to involve prolonged and expensive proceedings in Parliament arising out of the conflicting opinions and resulting opposition of the local authorities in the Board's area of supply."

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

A meeting of the Edinburgh and Leith Corporations' Gas Commissioners was held last Monday—Lord Provost Inches presiding. The Finance Committee's minutes included a report by the Treasurer (Mr. A. Canning Williams) that the gas revenue collected last year amounted to £266,108—a decrease of £5000. The total sale of gas for the year 1914-15 was 1,988,328,500 cubic feet, a decrease of 30,913,200 cubic feet, or 1·53 per cent., on that of the previous year. The falling-off was more than accounted for by the restricted public lighting, which resulted in a reduction of 31,971,800 cubic feet. During the spring term of 1915 the value of gas sold was £69,445—a decrease of £1933. The total receipts were £360,887—a decrease of £14,595.

At last Monday's meeting of the Edinburgh and Leith Corporations' Gas Commissioners, Bailie Lyon said that the question of an investment in the new war loan at 4½ per cent. had been considered; but they had not got the money. By anticipating, however, certain payments in connection with the superannuation fund, they would be in a position to invest £4000; and he recommended that this should be done. They could also exchange £4000 of stock in the old war loan, which would give them £8000 in the new. In the former loan they had £20,000. The recommendation was agreed to.

The Gas Committee of the Kirkcaldy Town Council, in their financial statement, show a deficit of fully £700 for the past year. They recommend an increase of 1s. per 1000 cubic feet, making the price of gas 4s. 5d. per 1000. This is principally due to the rise in the price of coal, which it is estimated will cost £6000 more than last year. Even with the increased price, it is anticipated that there will be a deficit of some £436.

The difficulty of obtaining men to take the places of those who have joined the Colours has led the Glasgow Corporation Lighting Department to experiment in the employment of women as stair lamplighters in the Eastern, Springburn, and Govan districts. They are to receive at the start the minimum wages of the men.

The illuminating power of the gas was referred to at a meeting of the Dundee Town Council, when Mr. Paton pointed out that, while the power was 17·26 candles at the beginning of May, it was down to 15·14 candles at the end of the month. Mr. Noble (the Convener of the Gas Committee) pointed out that under existing conditions, "it was antiquated to bring up questions of candle power." As a matter of fact, however, it was impossible to get coal to keep it up; and they had to take the best they could obtain.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 5.

Pitch is quiet, as is usual at this season of the year—the present value being 26s. per ton, nominal, in bulk, at makers' works. Creosote is 4⅛d. to 4¼d. per gallon, net, in bulk, at makers' works. Solvent naphtha is in demand at good prices. Benzol is scarce, owing to the Government having largely requisitioned available supplies. Sixty per cent. crude carbolic acid is steady at 3s. 6d. to 3s. 7½d. per gallon, net, casks free; 48-50 per cent. anthracene is 2¾d. per unit, casks free. Sulphate of ammonia continues on the up grade; and the present price for 25 per cent. quality is £14 7s. 6d. per ton, net, at makers' works, bags extra, for delivery to June, 1916.

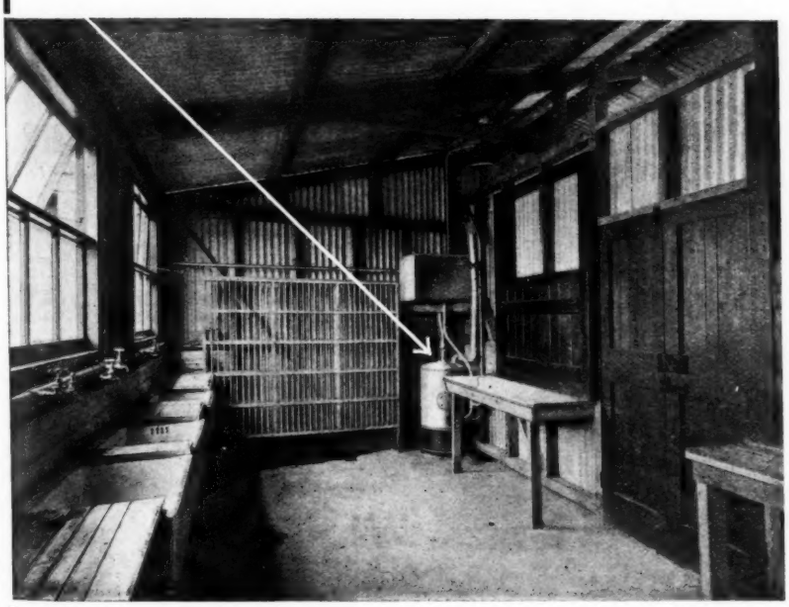
Tar Products in the Provinces.

July 5.

There has been very little fresh business in the markets for tar products during the past week. Distillers maintain their idea in regard to the value of pitch, but no business can be worked for the forward position owing to the uncertainty of freights. Solvent naphtha maintains its price, and is still in very good demand. Creosote is quiet, and there is plenty of the article offering in all quarters. Some business is reported in crude carbolic for this year's delivery at slightly lower prices.

The average values of gas-works products during the past week were: Gas-works coal tar, 21s. 6d. to 25s. 6d. Pitch, East Coast, 22s. to 23s. per ton; Norfolk, Suffolk, and Humber ports, 19s. to 20s.; West Coast, 20s. to 21s. Manchester; 21s. to 21s. 6d. Liverpool; 23s. to 24s. Clyde. Benzol, 90 per cent., naked, North, 10¾d. to 11d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 10d. to 1s. 11d. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3d. to 3 1/16d. Heavy oils, in bulk, 3⅝d. to 4d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 3s. 4d. to 3s. 6d.

THE "ZENITH" GAS-HEATED BOILER



The "Zenith" installed in the corner of a cookhouse of a temporary Military Camp.

The "ZENITH" is a COMBINED HEATER and STORAGE-CYLINDER.

Therefore no heat lost between heater and cylinder.

Constant supply of hot water available at any moment, day-time or night-time.

Made in three sizes, 10, 20, and 40 gallons, each complete with Thermostat.

Manufactured by

ARDEN HILL & CO., ACME WORKS, BIRMINGHAM.

Naphthalene, £8 to £16; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *July* 3.

Throughout the week there has still been no sign of any falling off in the demand for this article, the inquiry for shipment to Java being especially large, and once more considerably advanced prices have been obtained in all positions. The nearest values at the close are £14 12s. 6d. per ton f.o.b. Hull, £14 15s. f.o.b. Liverpool, and £15 f.o.b. Leith, for early delivery. For future shipment, £15 per ton at the chief ports has been paid repeatedly for equal monthly quantities from July, 1915, to June, 1916, and in some instances producers are now holding for still more money.

Nitrate of Soda.

The decline in the value of this material has been arrested, and the spot market is now very firm at 12s. per cwt. for ordinary, and 12s. 3d. for refined quality.

Sulphate of Ammonia.

From another source it is reported that this market has remained very firm throughout the past week, and the majority of manufacturers are asking very high prices for forward position. Outside London, makes are quoted at £13 12s. 6d.; Hull, £14 5s.; Liverpool, £14 7s. 6d. to £14 10s.; Leith, £14 10s.; and Middlesbrough, £14 5s. to £14 7s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is somewhat quieter; but there is a rather fuller demand for some of the better classes of both steam and gas coals, and for these the prices are well maintained on the whole. In the steam coal trade, best Northumbrians are from 20s to 20s. 6d. per ton f.o.b.; the supply being well booked for about a fortnight ahead. Second-class steams are offered freely, and may be quoted at about 17s. per ton; while for steam smalls the market seems quiet at from 14s. to 16s. per ton f.o.b. There is a fair output at the collieries when the reduced number of miners is taken into account. In the gas coal trade, the demand is full on the large current contracts, and prices are on the whole steady. Best Durham gas coals are 20s. per ton f.o.b.; for second-class gas coals the current price is from 17s. to 18s. per ton; and "Wear Specials" are in good demand at about 21s. to 21s. 6d. per ton f.o.b. The freight on gas coals is steady at about 7s. 3d. to 7s. 6d. Tyne to London; and tonnage is not over plentiful. There is not much forward business in gas coals being negotiated in this market at the present time; but shipments are heavy in coasting and in some of the French trades. With this month some of the contracts at better prices have come into operation, but additional sales are impeded by the difficulties of transit and possible changes in the prices. Coke is firm, with higher values. Gas coke is scarce through the lessened output. Good gas coke is dearer—from 26s. 6d. to 28s. per ton f.o.b. in the Tyne being the current quotation.

Alleged Gas-Works Nuisance.

Mr. Justice Ross, in the Chancery Division of the High Court of Justice in Ireland, refused an injunction sought by Mr. James Fletcher, hackney carriage owner, &c., of Bangor, co. Down, to restrain the Bangor Urban Council from causing a nuisance by erecting and working at their gas-works of a large retort-house close to plaintiff's premises, and from obstructing certain lights, creating noises, and causing offensive smells and vapours. Defendants traversed the alleged causes of action, and pleaded the Public Authorities Protection Act. His Lordship said he believed plaintiff brought his action honestly, and suggested that defendants might see their way not to ask for costs of the hearing, which occupied four days. The suggestion was agreed to. The Judge then dismissed the action, without costs, on condition that there would be no appeal. In a review of the evidence, his Lordship mentioned that especially of Mr. J. D. Smith, the Manager of the Belfast Gas-Works. Mr. Smith stated that the old system of gas making was an abominable one. The new system, however, was practically perfect; so that it was almost impossible for any dust to get out. The retorts had, no doubt, to be cleaned once a month; but this only occupied from 10 to 15 minutes. If Mr. Smith's evidence was true, his Lordship could not see how inconvenience could be caused by the works in their present state. In black dust substances which had been analyzed materials were found which came mainly from anthracite coal, and not from bituminous coal. In his belief, 90 per cent. of the dust matter complained of came from other sources than the gas-works. No evidence had been produced to show that the Bangor method of gas making was defective; and he was led to the conclusion that it was impossible that a nuisance of the kind described by the plaintiff could have been set up by it.

Gainsborough Gas Prices.—A special meeting has been held of the Gainsborough Urban District Council, to consider the best method of meeting an increase in cost of the production of gas for the year of nearly £3000. The opinion of the Gas Committee was that if they ceased to allow discounts, and effected other practicable economies, they would be able to avoid raising the price of gas or coming upon the rates. Some members thought that the price of gas should be increased; but after the matter had been discussed, it was decided to abolish the 12½ per cent. discount hitherto allowed to users of prepayment meters, and 10 per cent. to ordinary consumers.

SAWER AND PURVES

MANUFACTURERS OF PREPAYMENT AND ORDINARY METERS.

Wet or Dry.

FIRST IN 1889.

Any Coin.

FOREMOST IN 1915.

MILES PLATTING, MANCHESTER.

Wires: SAWER MANCHESTER. NOTTINGHAM.

'Phones: 3289 CITY, MANCHESTER. 2025 NOTTINGHAM.

RADFORD ROAD, NOTTINGHAM.

Yorkshire Price Increases.

The Dewsbury Corporation have confirmed the decision of the Gas Committee to advance prices by 4d. per 1000 cubic feet for lighting and power purposes, and to establish a charge of 6d. per quarter as rent for automatic meters.—The Batley Town Council last Thursday approved the recommendation of the Gas Committee for an increase of gas prices by 6d., making the new rates 3s. 6d. per 1000 cubic feet gross (3s. 1d. net, if paid within a specified time) for lighting, and 3s. gross (2s. 7d. net) for power, and the discontinuance of the discount hitherto allowed to consumers through automatic meters.—The price of gas at Thirsk has been increased from 3s. 8d. to 4s. per 1000 cubic feet.—Prices have been increased at Spenborough by 6d. all round.—The Birstall Gas Committee have recommended increases of 3d. per 1000 cubic feet all round —The Hellifield Gas Company have increased their price from 4s 6d. to 5s. per 1000 cubic feet, and in slot meters 16 cubic feet will be supplied for 1d. The rent for cookers is also increased. The Parish Council are objecting that the increases are exorbitant.—The Shillington Parish Council have protested against the increase of gas prices by the Ossett Corporation.—The Sowerby Bridge Gas Committee propose to advance gas prices by 6d. per 1000 cubic feet. The price at present is only 1s. 9d. net.

Porthcawl Gas-Works Purchase.

Last Saturday week the Porthcawl Council finally took over the gas-works, handing to the Company a cheque for the amount due. The proceedings in connection with the purchase have been long, and many fights have taken place during the period. The Council met with very great opposition at Porthcawl in the promotion of their scheme. Many public meetings were held and an informal poll was taken—the Council being defeated. Again at the statutory meeting of ratepayers the Council were defeated on the gas-purchase clause, by a majority of 32. Not to be denied, the Council demanded a poll by ballot, when they converted the adverse vote into a majority of 133 in favour of purchase. Fortunately for the Council, they had arranged for the purchase money before the war broke out. The arbitration proceedings took place in January of this year; and the umpire's award was for £30,396. It was admitted on all sides that the Council had obtained the works (which last year made a profit of over £2000) at a very low figure. The Council were successful last week in obtaining the Treasury sanction to the loan; and the money was borrowed at the originally agreed figure of 4½ per cent. for 35 years, or less should money get cheaper after the termination of the war.

Rather than increase the price of gas by 4d. per 1000 cubic feet to meet the increased cost of production, the Ambleside Urban District Council have decided to draw on the reserves that have accumulated in recent years.

Price Raised at Stourbridge.—At a meeting on Monday of last week, the Stourbridge Urban District Council decided to increase the price of gas 3d. per 1000 cubic feet to private consumers, and 2d. to users for power purposes. The prepayment consumers will receive 24 cubic feet of gas for 1d., which Alderman S. Fiddian (the Chairman of the Gas Committee) pointed out represents a rise of 1¼d. per 1000 cubic feet.

Price Increased at Sheffield.—The Sheffield Gas Company have decided to increase the price of gas 6d. per 1000 cubic feet to all classes of consumers, as from the June reading of the meters. To a representative of a local paper, Mr. Hanbury Thomas pointed out that the amount of the increase is no more than has been found necessary all over the country; but it seems so much more serious to Sheffield consumers because of the extremely low prices at which they have hitherto been supplied. He pointed out that extra costs due to the war were the cause of the increase, which was a great disappointment to him personally.

Hampstead and Reduced Lighting.—At the last meeting of the Hampstead Borough Council, the Town Clerk announced the receipt of a letter from the Commissioner of Police, referring to the occurrence of manifestations of popular opinion in favour of the total extinction of the street lighting when warning is received of an impending attack by hostile aircraft. The letter stated that, after very careful consideration of the matter by the Admiralty, their decision was that such a course was most undesirable. According to expert opinion, the extinction of street lighting would rather aggravate than reduce the degree of danger to which the public are exposed.

Economizing at Pontefract.—At a special meeting, the Pontefract Town Council confirmed, practically in their entirety, recommendations of a Committee appointed to go into the question of employment in the departments of the Corporation, with a view to economy. The Committee suggested that the Clerk of Works at the Roall Water-Works and a similar official employed at the workmen's dwellings should be dispensed with; that the four lamplighters be reduced to two; and that the caretakerships of the various municipal buildings be co-ordinated. Besides these, several labourers and street-sweepers it was recommended should be dispensed with. The total reduction of wages suggested is over £1200 a year—nearly equal to a 6d. rate.

Lytham Gas Undertaking.—At the last meeting of the Lytham District Council, the minutes were approved showing an increase in the price of gas of 3d. per 1000 cubic feet. It was stated that this was due to the greater cost of production. Arising out of the discussion, Mr. W. E. Garlick suggested that it would be well if some information were given regarding the financial side of the undertaking. He noticed an item, in regard to the cost of the new works, of £1023, which appeared as extras and paid for out of revenue. He thought they should know something more definite as to how it was there was no available surplus from the works. The Chairman said a statement could be made at a future meeting upon notice being given. He added that Mr. Garlick had touched upon a vital point.

PRACTICAL EXPERIENCE

shows Managers that the Water Heater which gives the most satisfaction to consumers, costs least to keep in order, and brings no complaints of heavy gas bills is a

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Every Machine embodies the result of OUR practical experience in manufacturing and fitting Geysers over a period of 45 years.

THE PARKINSON STOVE CO., Ltd.

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(ORIGINATORS OF "GEYSERS"),

BIRMINGHAM and LONDON.

We are always pleased to quote for modifications to suit special requirements.

Water-Works Loan Refused.—The Holywood (co. Down) Urban Council have expressed regret at the decision of the Commissioners of Public Works in Ireland, acting for the Treasury, refusing the loan, already sanctioned by the Irish Local Government Board, for water-works extensions. The Council consider the scheme urgent.

Coventry Water Undertaking.—The past year again proved a successful one for the Coventry Water Department. The accounts for the year ended March 31 show a net profit of £7369, and a disposable balance, after allowing for the amount brought forward from the previous year, of £7753. The Water Committee are recommending that the balance be dealt with as follows: £5000 in relief of the rates, £2000 to an appropriation account in respect of the laying of mains and other special purposes, and the balance of £753 to be carried forward.

Bradford Water Supply.—The Bradford City Treasurer has presented the balance-sheet of the Water Department, showing that the profit on the past year is only £5800, compared with £10,800 in the previous year. The income from the sale of water has decreased by £4100; this falling-off being accounted for entirely by a diminution in consumption since the outbreak of the war. Maintenance costs are £400 less. The Nidd Valley Light Railway, in connection with the water-works, owing to decreased mineral and goods traffic, shows a loss of £2420, as against a previous loss of £1660.

Higher Prices at Ilkeston.—There was considerable opposition at a meeting of the Ilkeston Town Council last Tuesday to a proposal of the Gas Committee to raise the rate charged for gas 6d. per 1000 cubic feet. An amendment moved by Mr. W. Smith, that any increase should be deferred until October, and that the price then should be advanced by only 3½d., was defeated; and the Committee's recommendation bringing the new scale into immediate operation was carried. The Mayor (Mr. J. A. Macdonald), who is Chairman of the Gas Committee, estimated that the increase would probably "see them through" on the year's operations, with a slight profit or slight loss. Fortunately, they were advised last year by the Gas Manager (Mr. J. Exton Holt) to buy coal heavily; and the stock purchased at the reduced rate would probably keep them going until October.

Actual and Estimated Periods of Sickness.—At a meeting in connection with the South Metropolitan Gas Company's Provident Society, the Secretary (Mr. H. Lesser) reported that the sickness experience for 1914 was appreciably better than 1913; and, better still, the length of sickness per member was shorter than had been the case for the last fourteen years. A table which had been prepared showed that health conditions under the Company's co-partnership system are manifestly superior to those on the average elsewhere, as estimated by the Government Actuary. The following are the 1914 figures of the Company, showing the number of weeks' sickness per member for the different ages stated; the Government Actuary's estimated figures of the average period of sickness per member being given in parentheses: 16 to 20 years, 0·51 (0·96); 21 to 25, 0·48 (0·89); 26 to 30, 0·54 (0·95); 31 to 35, 0·82 (1·06); 36 to 40, 0·91 (1·27); 41 to 45, 1·39 (1·58); 46 to 50, 1·45 (1·99); 51 to 55, 1·71 (2·76); 56 to 60, 2·29 (4·05); 61 to 65, 2·46 (6·44); 66 to 69, 5·35 (10·86).

Biddulph Gas Undertaking.—An exhibition of gas appliances has been held in the Public Hall, Biddulph, and was kept open for four days. Mr. A. Findlow, who performed the opening ceremony, remarked that by advertising the advantages of gas cookers, fires, &c., the Council hoped to increase the number of consumers. Practical support was necessary to render the Council's undertaking a success; and this meant an increased consumption. The scheme had met with strong opposition from the outset; and technical difficulties were encountered. These, however, were being gradually overcome. The war had also, to some extent, hampered the completion of the scheme, owing to the curtailment of the Council's borrowing powers by the Local Government Board; and this would probably delay the laying of the mains to the outside districts for some little time. Street lighting had been commenced; and the Council had already reduced the price of gas to 4s. 6d. per 1000 cubic feet, with a discount of 5 per cent. for prompt payment. The extensions of the gas-works would meet an increased consumption of several million cubic feet of gas. He looked forward with confidence to the time when the gas-works would prove, not a "white elephant," but a valuable asset, and a means of relieving the overburdened rates of the parish.

GAS COMPANIES IN THE STOCK EXCHANGE.

Last week, as in the week before, the War Loan was again the autocrat of the Stock Exchange, and markets in general had to bow to its behests. It is gratifying to be assured, from all quarters which ought to know, that the Loan's progress is such as to indicate a complete success in result; but meanwhile other important things are being crushed beneath its wheels. Pressure to realize other securities in order to take up the Loan made it at times difficult to deal at all; but towards the close there was some relief. Prices, of course, have tumbled all to pieces—in some lines they are hardly recognizable. New regulations affecting the Loan continue to come out. Last week it was a Bill to enable trustees to borrow so as to take up Loan—a forward step which has aroused misgivings as to its soundness in the minds of some; and a Bank of England memorandum has defined that the rights of conversions of Old Loan and Consols are inseparable from the holding of the New Loan. Within the Exchange a movement was started to petition the Committee to close at two o'clock; but it does not seem to have met with strong support. Business in the Gas Market showed some increase in volume over the meagre figures of the week before. Prices were uneven. Some issues were fairly firm; but in the majority of cases the general dislocation of markets influenced a fall. The Money Market was very easy for short loans, but discount rates hardened.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 83⅜, 84, 84¼, ditto debenture 59½, 60, Imperial Continental, 60, 60½. On Tuesday, European 14¼, 14½, 14⅜, Gas Light ordinary 83½, 84, Liverpool 100½, Oriental 106, South Metropolitan debenture 60. On Wednesday, Bombay 5, Gas Light ordinary 83½, 83⅞, 84, Imperial Continental 60, River Plate 75, South Metropolitan 89, ditto debenture 55. On Thursday, Continental Union 39½, 40, Gas Light ordinary 83½, 84, ditto debenture 60, 60½, Hastings 5 per cent. 103½, Imperial Continental 52½, 53, Primitiva 2⅜. On Friday, Commercial 4 per cent. 92, Gas Light ordinary 82, 82¼, 82½, 83, 83¼, 83½, 84, ditto preference 77⅝, 78, Imperial Continental 54½, 55, 56, Primitiva preference 3⅝. On Saturday, Gas Light ordinary 82, 82¼, 83, 83½, ditto maximum 67, ditto preference 77½, 78, South Metropolitan 90.

Bank rate (fixed Aug. 8), 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING JULY 3.

Issue.	Share.	When ex-Dividend.	Dividend or Interest & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p c.			£ s. d.	
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59—64	3 18 2	..
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5⅞—6⅜	5 17 8	5
50,000	10	Feb. 26	16	Bournemouth Gas and Water: 10 p.c.	29—30	5 6 8	..
873,480	10	,,	7	Bournemouth Gas and Water: B 7 p.c.	15—15½	4 10 4	..
95,000	10	,,	6	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	4 5 9	..
—	—	—	—	Bournemouth Gas and Water: Deb.	..	—	..
890,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	5 5 3	..
830,000	,,	,,	11	Do. New	204—209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	5 3 4	..
244,200	,,	,,	8	Do. A Ord. Stk.	154—159	5 0 8	..
630,000	20	Mar. 26	12½	British	44—45	5 11 1	..
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½—2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	5 1 2	92
660,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½—71½	4 8 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76—79	5 1 3	39½—40
200 000	,,	,,	7	Do. 7 p.c. Pref.	115—118	5 18 8	..
—	—	—	—	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	Derby Con. Stk.	123—125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½—18	5 11 1	14½—14⅝
16,362,910	Stk.	Feb. 12	4/17/4	Gas and Light and Coke: 4 p.c. Ord.	98—102	4 15 6	82—84½
2,600,000	,,	,,	3½	Gas and Light and Coke: 3½ p.c. max.	76—79	4 8 7	67
4,062,235	,,	,,	4	Gas and Light and Coke: 4 p.c. Con. Pref.	96—99	4 0 10	77½—78
4,674,850	,,	June 11	3	Gas and Light and Coke: 3 p.c. Con. Deb.	72½—74½	4 0 6	59½—60½
130,000	,,	,,	10	Gas and Light and Coke: 10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	Hongkong & China, Ltd.	16¼—16⅜	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7⅞†	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6¾†	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150—160	5 12 6	52½—60½
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	..
661,000	Stk.	Feb. 26	10	Liverpool 5 p.c. Ord. A	211—213	4 18 11	100⅛
718,100	,,	,,	7	Liverpool 5 p.c. Ord. B	146—14	4 14 7	
306,083	,,	June 26	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	—
75,000	5	June 11	6	Malta & Mediterranean	4⅛—4⅜	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 28	4	Monte Video, Ltd.	11½—12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	Do 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—15	5 2 8	..
300,000	Stk.	May 14	8	Oriental, Ltd.	117—122	6 11 2	106
60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛—7⅜	6 9 0	..
60,000	50	Feb. 26	18	Portsea, Island B	128—131	4 19 3	..
100,000	50	,,	12	Do. C	118—121	4 19 2	..
52,000	50	,,	10	Do. D	..	—	..
249,980	5	April 29	8	Primitiva Ord.	5⅛—6	6 13 4	2⅜
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅜—5	5 0 0	3⅜
521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	4 12 0	75
150,000	10	May 14	6	San Paulo 6 p.c. Pref.	10⅛—11	5 9 1	..
125,000	50	July 1	5	San Paulo 5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223—224	4 9 3	..
209,984	,,	,,	10	Do. B	222—224	4 9 3	..
533,500	,,	,,	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	South African	10⅛—11½	7 16 6	..
6,429,895	Stk.	Feb. 12	5/4/0	South Met., 4 p.c. Ord.	111—113	4 16 8	89—90
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	55—60
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	5 3 5	..
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	4 9 3	..
—	—	—	—	Do. West Kent.	..	—	..
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	..
629,740	Stk.	May 14	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham and District: A 5 p.c.	135—138	5 8 8	..
742,275	,,	,,	6†	Tottenham and District: B 3½ p.c.	115—117	5 2 7	..
181,255	,,	June 26	4	Tottenham and District: 4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
30,000	Stk.	Feb. 26	8⅜	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6½	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110—115	5 2 0	..
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅜	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

Price of Gas at Haverhill.—In a report submitted to the Haverhill Urban District Council, the Gas Committee stated that they had had under consideration the question of the price of gas, and had decided to defer for the present consideration of the matter.

Wages Demands Refused at Darwen.—The General Purposes Committee of the Darwen Corporation have now considered the report of the Sub-Committee who had met representatives of the Gas-Workers' Union with reference to the applications of the employees for increased wages. They decided to recommend the Council to adhere to their previous decision not to grant advances to any employees during the period of the war.

The City of London Gas Examiner.—At the meeting of the City Corporation last Thursday, the result was announced of a ballot taken to decide upon the petition of Professor Vivian B. Lewes for an increase of salary. The Committee's recommendation was that the salary should be increased from £400 to £500 per annum as from Lady Day. There voted 78 for the affirmative and 68 for the negative. Professor Lewes therefore secures the advance.

Dearer Coal Advances Marple Gas Prices.—The Marple Urban District Council recently issued to consumers a provisional notice of their intention to increase the gas charges to all classes of consumers 6d. per 1000 cubic feet, such increase to take effect from the June quarterly meter-readings. It was found, however, on the renewal of the coal contracts [at prices which proved to be 6s. per ton higher than last year, whereas the 6d. advance only allowed for 5s. per ton increase], that a further increase of 1d. would have to be made; and an amended notice has now been issued to consumers showing an increase of 7d. per 1000 cubic feet.

Blackburn Water Engineership.—The printed minutes of the General Purposes Committee of the Blackburn Corporation contained a report by the Sub-Committee appointed to consider the question of the vacancy caused by the retirement of Mr. W. Stubbs, the Borough and Water Engineer. They recommended: (1) That the position continue to be the dual position of Borough and Water Engineer; (2) that an advertisement be issued inviting applications for the position at the commencing salary of £700 per annum, canvassing not to be allowed, but copies of applications permitted to be sent to members of the Committee; (3) that the definition of duties of the position already in existence be confirmed. The report was referred back to the Sub-Committee for further consideration.

Oldham War Bonus Decision Re-affirmed.—A Special Committee of the Oldham Town Council met last Thursday to further consider the application of the Corporation employees (including those engaged in the Gas and Water Departments) for a war bonus. The meeting was called in response to a request of Mr. J. R. Clynes, M.P., General Secretary of the Gas-Workers' Union. The Committee re-affirmed their previous decision not to recommend the Council to grant war bonuses. The application had previously been refused on the grounds that the men, who were in steady employment, and were in better circumstances than many ratepayers who would be called upon to bear the extra expense.

The Cambridge University and Town Gas Company are increasing the price of gas to 3s. per 1000 cubic feet.

While waiting for a jug of water to fill up a water-slide chandelier, Mrs. Brassington, of Alsager, incautiously lit a match. As a consequence, she was badly burned about the face and arms, while the house and its contents suffered material damage.

The Kildwick Parish Gas Company have advanced the price of gas for lighting from 2s. 11d. to 3s. 4d. net per 1000 cubic feet. For heating and cooking purposes also, the price has been raised to 3s. 4d. (returning to a former figure, after several reductions in recent times), and 2½d. discount is to be allowed.

The employees of the Tottenham District Light, Heat, and Power Company have been informed that they are to receive increased bonuses. Hitherto employees earning up to 30s per week have had an extra 3s.; and those earning more, 2s. Now the bonuses are to be 4s. and 3s. respectively. Boys under 18 years of age, who have not hitherto been paid anything extra, are to get 1s. 6d. per week. The staff with salaries up to £160 per annum have been receiving 5 to 7 per cent. increase; and the maximum is to be extended to £200 a year.

The Spenborough Council propose to reduce the staff at the gas-works. Representatives of the Gas-Workers Union were permitted to visit the works to form a judgment, on behalf of the men, as to whether the Union could agree to the proposed reduction, and had reported that they could not agree, but promised to lay before the men any other proposals the Committee might bring forward. After further consideration, the Committee decided to give a fortnight's trial to work by a reduced staff, and to submit this proposal to the men.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS ENGINEER AND MANAGER. Abertillery Urban District Council. Tenders by July 17.
DRAUGHTSMAN. Drakes Limited, Halifax.
ENGINEER AND MANAGER. Salisbury Gas Company. Applications by July 19.
WORKS FOREMAN. No. 6060.
CARBONIZING FOREMAN. No. 6061.
CARBONIZING FOREMAN. No. 6062.
GAS WORKS FITTER. No. 6063.
STOKERS. Ulverston Gas and Water Works.

Plant, &c. (Second Hand), for Sale.

MANUAL CHARGING MACHINES. Weston-super-Mare Gas Company.

Patent Licence.

ATMOSPHERIC GAS-BURNERS. Browne and Co., Warwick Court, Holborn.

TENDERS FOR

Coal.

NEWBURY GAS DEPARTMENT. Tenders by July 12.

General Stores (Flexible Tube, Lead Pipe, Main Taps, Fire Cement, Vitriol, &c.).

NORTHWICH GAS COMPANY. Tenders by July 10.

Mantles.

NORTHWICH GAS COMPANY. Tenders by July 10.

Pipes, &c.

NORTHWICH GAS COMPANY. Tenders by July 10.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 171, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, May 11, p. 314.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
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AND
CARBURINE FOR GAS ENRICHING
ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.
SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 4452 and 4453 London Wall.
Telegraphic Address: "Carburine, London."

OXIDE OF IRON.
We are in a position to Supply Oxide of Iron promptly, and invite Enquiries.
SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
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"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
5, CROOKED LANE, LONDON, E.C.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
5, CROOKED LANE, LONDON, E.C.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, Rose Mount Ironworks, Elland.

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SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—

BALE AND HARDY,

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SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by

CHANCE AND HUNT, LIMITED.

Works: Oldbury, Wednesbury, and Stafford.

Address Correspondence and Inquiries to Oldbury, Worcs.

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THOMAS HORROCKS & SONS, LTD.,

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Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Lysol, Sulphate of Ammonia.

ALDER AND MACKAY (Established 1850).

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EDINBURGH.

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SPECIALLY prepared for the manu- facture of SULPHATE OF AMMONIA.

SPENCER CHAPMAN & MESSEL, LTD.,

with which is amalgamated Wm. Pearce & Sons, Ltd., 6, Mark Lane, London, E.C. Works: Silvertown.

Telegrams: "Hydrochloric, Fen. London."

Telephone: 1588 Avenue (3 lines).

R. & G. HISLOP,

GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.

RETORT SETTINGS, COAL TESTING PLANT BOILER FIRING.

Communications should be addressed to Underwood House, PAISLEY.

TAR WANTED.

THE Burnden Tar Company (Bolton), Ltd. Hulton Chemical Works, BOLTON.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

Firth Blakeley, Sons, and Company, Limited, Church Fenton, near Leeds.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.

It is also used for the Enrichment of Gas.

Manufactured and Supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agents, F. J. Nicol & Co., Pilgrim House, Newcastle-on-Tyne.

Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

TAR WANTED.

JOSEPH A. HUTCHISON, LIMITED, Highbridge Wharf, SOMERSET.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.

We Guarantee promptness with efficiency for Repairs.

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Telegrams: "Saturators Bolton." Telephone 0848.

PATENTS AND TRADE MARKS PUBLICATIONS: "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

CHEMIST.

APPLICANTS for the above Post, advertised under No. 6035, "Gas Journal" Offices, are THANKED, and Informed that THOSE PERSONS WHO HAVE NOT BEEN COMMUNICATED WITH ARE NOT ONE OF THE SELECTED CANDIDATES.

BOROUGH OF DROITWICH.
(Gas Department.)

APPLICANTS for the Post of Engineer AND MANAGER are THANKED FOR THEIR APPLICATIONS, and are Informed that the APPOINTMENT HAS BEEN FILLED.

S. J. Tombs,
Town Clerk.

Town Hall, Droitwich,
June 30, 1915.

ABERTILLERY URBAN DISTRICT COUNCIL.

APPOINTMENT OF GAS ENGINEER AND MANAGER.

THE Council invite Applications for the Position of ENGINEER and MANAGER of their Gas Undertaking. Preference will be given to Candidates with Experience in Carburetted Water Gas and Sulphate of Ammonia Manufacture.

Salary, £250 per Annum. Coal and Gas.

Applications, stating Age, Qualifications, and Experience, together with *copies* of not more than Three recent Testimonials and endorsed "Gas Engineer," to be sent to the undersigned not later than Saturday, the 17th of July, 1915.

Canvassing, Directly or Indirectly, will be regarded as a Disqualification.

William Gait,
Clerk to the Council.

Council Offices, Abertillery,
Mon., June 30, 1915.

WANTED—a Reliable Draughtsman, with Experience in Structural Steelwork and Gas-Works Plant.

Apply, by letter, to Drakes Limited, Halifax.

WANTED, by a Gas-Works in the South of England making about 170 Millions, a WORKS FOREMAN. Must be thoroughly Reliable and well able to Control Workmen. Experience as a Carbonizing Foreman on Regenerator Settings essential. House, Fuel, Light, Rates, and Water free.

Apply, stating Wages required, Age, and Full Particulars of Experience, with *copies* of Testimonials, to No. 6060, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CARBONIZING FOREMAN.

GAS Company making about 350 Millions require an Experienced FOREMAN to Take Charge of Carbonizing. Must be used to Machine Stoking and Regulation of Heats.

Apply, by letter, stating Age, Experience, and Salary required, to No. 6061, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CARBONIZING FOREMAN.

WANTED—by a Gas Company in the West of England making about 220 Millions, a CARBONIZING FOREMAN. Must be thoroughly Reliable, and Able to Control Workmen. Experience with Regenerator Settings and Carburetted Water-Gas Manufacture essential.

Apply, by letter, stating Particulars of Experience, with *copies* of Testimonials, to No. 6062, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS-WORKS FITTER.

WANTED—by a Gas Company in the West of England making about 220 Millions, a Good All-Round WORKS FITTER, accustomed to the Erection of Retort-House Ironwork, Gas, Steam, and Water Pipes. One with a knowledge of Engines, Exhausters, and Smithing preferred.

Applications, by letter, stating Age, Wages required, and accompanied with Reference, should be addressed to No. 6063, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

STOKERS.

WANTED—Two Good Shovel Char- GERS for a Works making 65 Millions. Twelve-Hour Shifts—7½ and 6½ alternately. Wages, 5s. 9d. per Shift. Accustomed to Regenerative Settings. One Week's Holiday and Pay per Year. Permanent Situation to Reliable Men.

Apply to the Manager, Gas and Water Works, Ulverston.

SALISBURY GAS LIGHT AND COKE COMPANY.

THE above Company invite Applica- TIONS for the Post of MANAGER and ENGINEER of the above Company (160 Million Cubic Feet), acquainted with Oil-Gas Plant, Tar Dehydrating Plant, and Aldridge and Ranken's Electrically Driven Charging Machinery.

Salary, £400 per Annum.

Applications, endorsed "Gas Manager," and accompanied by *copies* of not more than Three Testimonials, must be received by me not later than the 19th of July, 1915.

Arthur Whiteheap,
Secretary.

Salisbury, July 5, 1915.

INDUSTRIAL Gas Appliances—Tech- NICAL SALESMAN Wanted by Large Manufacturing Firm. Must have sound knowledge of the Application of Gas to Industrial Processes.

Apply, giving full Particulars of Qualifications, Experience, and Salary required, to No. 6054, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

"RAPID" Manual Charging Machines for DISPOSAL. Low Price. Replaced by Power Machine.

J. Taylor, Engineer, Gas-Works, Weston-super-Mare.

STEAM-ENGINES and Exhausters COMBINED—120,000 per Hour Capacity. Seen Running by Appointment. £150 each to effect Immediate Sale. Guaranteed Working Order.

Firth Blakeley, Sons, and Co., Ltd., Church Fenton, Leeds.

NORTHWICH GAS COMPANY.

THE Directors of the above Company invite TENDERS for the undermentioned GOODS as may be required during the Year ending June 30, 1916.

1.—FLEXIBLE TUBE.
2.—LEAD PIPE.
3.—WROUGHT-IRON TUBES and FITTINGS.
4.—MAIN TAPS, &c.
5.—FIRE CEMENT.
6.—MANTLES.
7.—VITRIOL.

Further Particulars and Form of Tender may be had on Application to the Engineer and Manager, Mr. J. A. Brentnall.

Tenders, endorsed "Tenders for ——," and addressed to the Chairman, must be Delivered on or before Saturday, July 10, 1915.

By order,
P. S. Welbourn,
Secretary.

BOROUGH OF NEWBURY.
(Gas Department.)

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the Supply of about 6000 Tons of Screened or Unscreened GAS COAL or NUTS, to be Delivered at Newbury, Great Western Railway, during the Year ending June 30, 1916.

Sealed Tenders, endorsed "Tenders for Coal," and addressed to the Chairman of the Gas Committee, Gas-Works, Newbury, are to be sent in by the 12th of July.

The Gas Committee do not bind themselves to accept the lowest or any Tender.

Tender Forms from the undersigned.

W. R. Davey,
Manager.

Gas-Works, Newbury.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 37, Walbrook, E.C.

THE Proprietor of Letters Patent No. 9610, of 1911, for "IMPROVEMENTS IN AND RELATING TO ATMOSPHERIC GAS AND LIKE BURNERS," is Desirous of entering into arrangements, by way of a LICENCE or otherwise, upon Reasonable Terms, for the purpose of EXPLOITING the above Patent and ensuring its Practical Working in Great Britain. All Communications should be addressed to Browne and Co., Patent Agents, 9, Warwick Court, Holborn, London.

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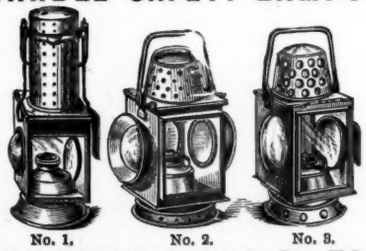
CANDLE SAFETY LAMPS.



No. 1. No. 2. No. 3.

34, Manchester Street, Gray's Inn Road, W.C.